

ROCKING THE SEA OF TIME

EXPERIENCES AS VESSELS BRINGING *PILOT VISION* TO PEOPLE IN TRANSIT



Mathijs Provoost

New Media Design and Production

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ABSTRACT

This thesis explores how ABB Ability™ Marine Pilot Vision (PV) can provide new customer value. PV is a sensor fusion solution monitoring the surroundings of the vessel to gain situational awareness for the ferry operation. The research question is how can Pilot Vision data be adopted for new transit experiences for crew and passengers beyond ship operations.

The study uses a phenomenological approach to analyse the current and desired transit experiences, and builds on previous research by e.g. Hassenzahl (e.g. 2013 and 2017) and Desmet (2012). Experience goals are set based on a model by Kaasinen et al. (2015). The research is organised in two cycles. First, the methods include literature review, diary study, in-depth interviews and observations. The second part comprises concept development, building a provocative prototype and testing it.

The results show the variety of current transit-related experiences that can be improved by the setting experience goals: Stimulation, Fellowship, Fascination, Inspiration, Freedom and Dreaminess. The Rocking concept utilizes the motion and camera vision data of PV. It proved to be the best concept to achieve the goals. The provocative prototype of Rocking addressed hedonic and pragmatic qualities that are important for desirable transit experiences. The Rocking concept can bring new opportunities for enhancing the surroundings for ferry transit experiences by using PV data.

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ABBREVIATIONS

ABB M&Ps – ABB Marine and Ports

AV – Audio Visual

EDD – Experience-Driven Design

GIS – Geographic Information System

IoT – Internet of Things

IR – Infrared

OSC – Open Sound Control

PSSD – Product Service System Design

PV – ABB Ability™ Marine Pilot Vision (Pilot Vision)

XD – Experience Design

INTRODUCTION

This thesis is founded on the test case of *ABB Ability™ Marine Pilot Vision* (hereafter referred to as *PV*) on the passenger ferry *Suomenlinna II*, developed at *ABB Marine and Ports (ABB M&Ps)*, Helsinki, Finland. *PV* is a situational awareness solution for nautical vessels which advances the development of intelligent shipping, where ships are more connected, leading towards more autonomous vessels. Before the thesis project, *ABB M&Ps* had already advanced the technology in-house by analysing and determining the usage scenarios of this solution for ship operations. The test case provided opportunities that derive from a creative and human-centric design approach, by envisioning and testing beyond the currently known uses of *PV*. However, new usage scenarios can be found beyond ship operations, addressing different users.

Consequently, the aim of the thesis project is to find new and innovative applications of *PV* for customers' customers of *ABB M&Ps*. Thus, the quest must diverge into human-centric design, using various human-centric research methods and focussing on potential indirect customers and identifying their needs, goals and deepest fears. Therefore, data from *PV* can be adopted to address people with experiential usage scenarios based on real life experiences. In order to illustrate the origin of *PV*, the following section present the strategy and practice of *ABB*, *ABB Ability* and *ABB M&Ps*.

ABB

"LET'S WRITE THE FUTURE. TOGETHER"

ABB describes itself as a global leader and pioneer in power and automation technologies pushing digitalisation in the industrial sector (About *ABB*, n.d.). Their goal is to encourage economic growth without crippling the globe and polluting its atmosphere (*ABB and Solar Impulse: building a better world*, n.d.). Therefore, they focus on the development of technologies with an as low environmental impact and as high accessibility as possible. For instance, combined renewable resources have proved to be a reliable round-the-clock electricity supply in *ABB's* microgrid solutions. These resources combined with Internet of Things (IoT) optimization allow *ABB* to build sustainable transport solutions and to lead the next industrial revolution, where everything is developing into more digital and connected solutions.

ABB ABILITY™

"WRITING THE DIGITAL FUTURE TAKES ABILITY."

ABB Ability™ is described as *ABB's* digital industrial IoT platform product, which connects the customers' devices, systems, solutions and services via the cloud. For instance, the cloud connection enables customers to 'know more, do more, do better, together', having a direct connection to customers that allows data to turn into a feedback loop calling for action (*ABB Ability*, n.d.).

ABB MARINE & PORTS

ABB Marine & Ports (ABB M&Ps) is one of the business units within *ABB's* business divisions of Industrial Automation. The automation within *ABB M&Ps* is focused on developing and implementing various technologies and systems that pave the way for a fully autonomous shipping industry.

Currently the main focus within the research and development of autonomous shipping is to build trust while advancing industry regulations and focusing on novel ideas rather than getting mentally stuck with the current technology and regulations. Technological evolution provides the opportunity to make the shipping industry smarter in various ways. This opportunity will be missed if digitalisation is merely an implementation: 'Can you imagine an autonomous steam ship [sic]?' (Tervo, 2017) With this quote, Tervo deftly illustrates what *ABB M&Ps* stands for, approaching future shipping with a holistic view. Keeping old mechanics in place would overcomplicate the digital systems, leading to less energy efficient solutions. For instance, in the case of an autonomous steamship a robot shovelling coal into the engine would be required. Thus, digitalisation and electrification should enable the systems to become simpler when implemented in a smart way.

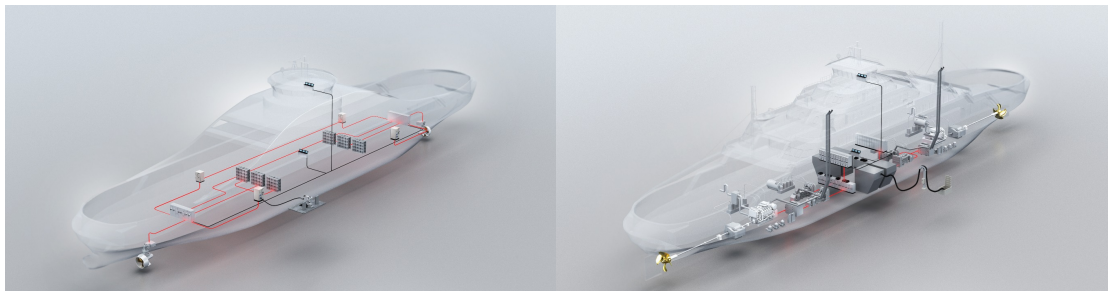


Figure 1. Electric is more efficient and flexible, better connected and simpler.

The holistic view is not limited to automating new vessels; rather, the whole shipping industry is taken into account by making the current vessels safer too, which can be achieved via retrofitting. As a result, the situational awareness system advances the building of trust by acquainting different stakeholders with the performance of Intelligent Shipping.

Intelligent shipping is a stepping-stone within *ABB M&Ps'* strategy to make shipping fully autonomous. Before making the shift towards fully autonomous shipping, different steps are required, the main one being increasing safety in the marine industry and remote operated vessels. By doing so, not only trust but also insights and expertise are steadily gained in the different areas of Intelligent Shipping. The core principles of their vision are to make vessels fully electric, digital and connected. To sum up, the evolution towards autonomous shipping requires gaining trust and acceptance from the marine industry by establishing

safe operations, sufficient reliable energy provision and digital predictions.

Autonomous does not mean unmanned: for instance, when referring to autonomous vehicles, there are still passengers on board. Unmanned vessels are considered improbable due to the international code for safety and rescue purposes, where a rescue boat needs at least two crews of three crewmembers (International Maritime Organization, 1999).

ABB ABILITY™ MARINE PILOT VISION

The before mentioned strategies and visions from *ABB* and *ABB M&Ps* are comprehensibly embodied in the situational awareness solution *ABB Ability™ Marine Pilot Vision (PV)*, aiming to become the leader in future shipping. *PV* is *ABB M&Ps*' sensor fusion solution, which monitors the surroundings of the vessel to gain situational awareness. Situational awareness is the most recent solution leading to intelligent shipping and can be currently seen as an enabler for better and safer ship operations and of essence in autonomous ship operations. *PV*¹ is the first of its kind on the market and is available from November 2017. *PV* is part of a future product ecosystem within intelligent shipping, a step towards autonomous shipping.

Further development of *PV* requires tests. Thus, a test case of *PV* has been installed on *Suomenlinna II*, one of the three ferries that connects Helsinki city centre from Kauppatori to the sea fortress of *Suomenlinna*. The popular tourist destination of *Suomenlinna* is a sea fortress and former naval base from the 18th century. The sea fortress stretches over a group of six islands; *Kustaanmiekka*, *Susisaari*, *Iso-Mustasaari*, *Pikku-Mustasaari*, *Länsi-Mustasaari* and *Särkkä*. The Finnish name *Suomenlinna* translates to *Finland's Castle* literally. Apart from a naval school, there are also about 850 residents living on the islands.



Figure 2. Suomenlinna

¹ Youtube video https://youtu.be/9xYS_B4dnlM

² Neveneffecten Youtube video <https://youtu.be/pEZn1rXWdYc>

The transit from Kauppatori to Suomenlinna takes about 12 to 15 minutes, depending on the water traffic and weather conditions. The seasons provide extremely diverse sailing conditions, with ice in the winter and a busier schedule in summer for Suomenlinna II. Suomenlinna II has the smallest *Azipod* propulsion system installed by *ABB* and was chosen as a practical nearby test case.



Figure 3. *Suomenlinna II*

For the test case four identical nodes with sensors are installed on *Suomenlinna II*. The sensors used in the nodes are LIDAR's, gyroscope and accelerometer units, infrared (IR) lights and cameras, vision cameras, a zoom tilt pan camera. These sensors are combined with already present data such as GPS data of the vessel itself and GIS data of the surrounding vessels.

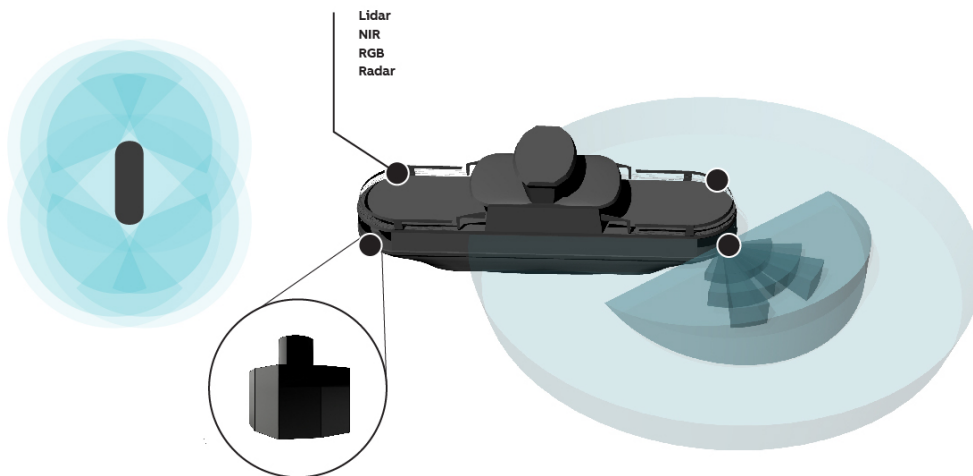


Figure 4. *ABB Ability™ Marine Pilot Vision* on board *Suomenlinna II*.

PV consists of four nodes mounted on the side of *Suomenlinna II* with 4 different types of sensors, LiDAR, Infrared and RGB camera and a radar, in addition there is a Pan-Tilt-Zoom camera and Radar mounted on top of the ferry.

BRIEF

“CUSTOMER EXPERIENCE OF CUSTOMERS’ CUSTOMER”

The brief given by ABB M&Ps can be summed up as *“Customer experience of customers’ customer”*. The customers of ABB M&Ps are the shipyards and the ship owners, in this case *Suomenlinnan Liikenne*. The goal of this design research project is to identify the intended customer value through additional touch points or business ideas utilizing PV’s new intelligent shipping solutions. Thus, how can ABB M&Ps provide extra value through PV to ABB’s customers by addressing their customers’ *‘Jobs to be done’* for their customers (customers’ customers) (Christensen, Hall, Dillon, and Duncan, 2016)? The customers’ customers, those who are directly or indirectly involved with *Suomenlinna II*, are the people involved on board the vessel, such as passengers and crew but also the people or institutions involved in the funding such as the regional transport authority HSL and *The City of Helsinki*. Here the example of *Suomenlinna II* is explained but other cases such as *M/S Viking Grace* are taken into account to see what opportunities are available for PV and how can customers’ customers be addressed with new Ferry and Cruise experiences.

The definition of customers’ customer is seen as wide as possible in the beginning and narrowed down during the process. The customers’ customer to design for is defined through different exercises and research methods. Customer can refer to both passengers and crew, from operation to services. However, even people who are not on board but on land are kept in mind. They can be future users of the adoption as they might be controlling the ship remotely or contacting people on board over a distance. Therefore, the target audience is referred to as *people* instead of as *customers* as this helps to personify them (Norman, 2006).

The focus of the project is not on the operation or monitoring of the environment and surroundings of the vessels as that has already been covered while PV was developed. Instead, this project opens a new, wider and uncharted sandbox where the toy, PV, is given a nearly complete freedom for an unknown outcome. The result of the exploration has to be experiential and new compared to the current offering.

The main goal is to find and define meaningful transit experiences and design for these experiences. Through this process, the target audience can be provided with a more meaningful transit experience through utilising an adoption of the sensor data of PV.

DESIGN DRIVERS

The three design drivers behind the design research project have all a different target, ranging from easily implementable ‘low hanging fruits’ to far-reaching future scenarios. By expanding the solution space through involving different stakeholders the chances for new and innovative results increase drastically.

The first design driver is to address the existing customers' customers within intelligent shipping, to find the solutions that are 'low hanging fruits', easy to implement. Here *PV* is explored from the point of view of supporting intelligent shipping.

Secondly, the focus is shifted beyond intelligent shipping, seeing the current customers' customers as users, and how this can lead to new valuable solutions. Here the focus is on how *PV* data can offer other usage scenarios.

The final direction is to investigate who else can benefit from *PV* and how new customers can be reached through completely new business ideas. The point of view is addressing human psychological needs.

At the moment the solution space explored by ABB is still fuzzy but there is a clear future goal defined with the current insights. The goal is to address people's needs beyond and outside the currently existing solution space. By exploring beyond the existing solution space, new insights can be found, still having the chance to become a significant part of the future product offering (fig. 5).

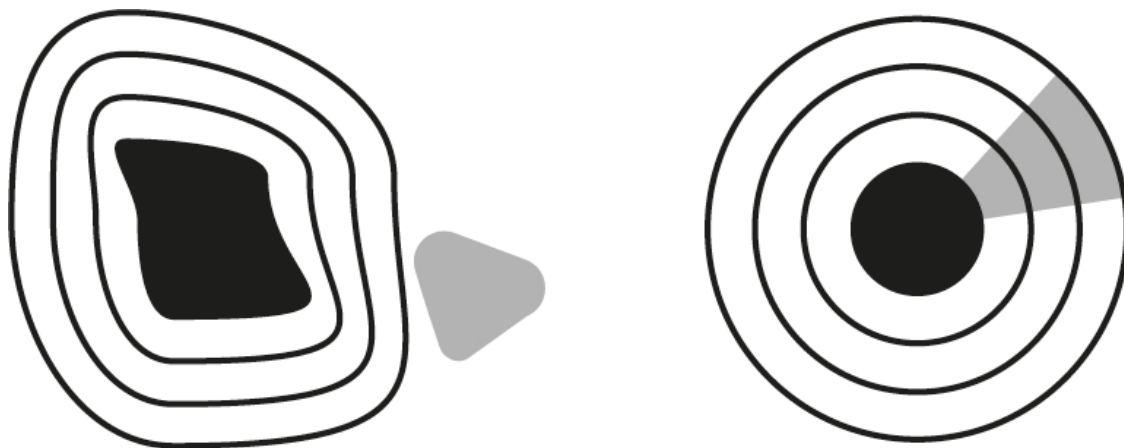


Figure 5. S. Vanhakartano, personal communication (2017)

DELIVERABLES

The end result is delivered as a product service concept. The concept showcases how additional value can be created through opening up the technology and data of *PV* to old and new customers. In addition, a prototype, test results and demo are delivered to validate the objectives of the design research project in a tangible manner.

SCOPE

The scope was narrowed from an early stage to enable focus on the approaches that are likely to have more successful outcomes, according to the initial exploration.

Building a full business plan is not part of this thesis as that would set different time and experience requirements. However, a broader suggestion is made for future business ideas and vision in addition to multiple solutions that are presented too.

In order to gain a diverse view, the scope covers both ferries and cruises. This differentiation is not made here, as it is more up to the passengers and crew to decide on how they see the vessel. While for the industry it is often necessary to differentiate these two (Markus Ahola, personal communication, 2018), not reducing the playground allows expanding and viewing how the end result can be implemented elsewhere.

All in all, the brief is very broad and loose. There is no clear idea of where to start exactly and the outcome is unknown. Hence, the only option is to dive deep into user studies and connect the findings to related theory, and this way starting to create from there on, with the technology and brand of *ABB M&Ps* in mind.

RESEARCH OBJECTIVE

The key objective is to find and verify new opportunities to improve customer experience for customers' customers with the use of *PV*. For uncovering new opportunities and to enable design for meaningful experiences it is necessary to focus on possibilities and not problems (Desmet & Hassenzahl, 2012) on board ferries and cruises.

The goal is to find possible meaningful experiences for *ABB M&P's* customers' customers and to understand people's needs in the context of ferry and cruise transit. A phenomenological approach is required as Fokkinga and Desmet (2012) state; this type of approach is ideal for uncovering how people behave and it helps to understand the needs, goals and wishes behind their behaviour.

In addition, as Hassenzahl (2008) argues, this is only a valid method when combined with existing knowledge on basic human needs. This is also confirmed by Desmet & Hassenzahl (2012, p.14) '...the possibilities needs to be rooted in our knowledge of happiness, human practice and human needs.' Following the method, new and desired experiences can be selected and designed and developed for.

HYPOTHESIS

As sensors of *PV* monitor the surroundings of sailing vessels, this study investigates the opportunities for providing enjoyable and meaningful activities for people on board the vessel through utilising the sensor data.

The experience on board of sailing vessels is strongly dependant on the surroundings and the vicinity of the vessel. Hence, emphasizing the vessel's surroundings enhances the transit experience.

RESEARCH QUESTIONS

To test the hypothesis, the following research question is explored:

How can ABB Ability™ Marine Pilot Vision be adopted for new transit experiences for crew and passengers beyond ship operations?

This question consists of the following sub questions:

- a. Which transit experiences do people have?
- b. What are desirable transit experiences on vessels?
- c. How can ABB Ability™ Marine Pilot Vision data be adopted to address these desirable transit experiences?

THESIS STATEMENT

The purpose of this thesis is to pick out intended customer value through utilising *ABB Ability™ Marine Pilot Vision* situational awareness solution. The nature of this purpose requires different approach than when developing the solution. Thus, a phenomenological research of ferry and cruise experiences is proposed. Cruise experiences focus on entertainment offerings that are readily available ashore, whereas ferry experiences are often neglected as ferries are seen as a commuter travel mode. An adoption of *ABB Ability™ Marine Pilot Vision* can provide and highly improve new transit experiences on-board vessels for crew and passengers by connecting the ferry and cruise experience more to the surroundings and the people on board.

INSPIRATION

Two influential studies on transportation have been comedy TV episodes where researchers study means of transport as if they are animals in a National Geographic or BBC documentary format. The first TV documentary is by *Neveneffecten* (2005) where the fictional researchers navigate to *The source of the E40*² (*De bron van de E40*) as if the motorway is a river. The second TV documentary is *Viimeiset Vaeltajat*³ by *Studio Julmahuvi* (1998) where the actors study Tram 7 in Helsinki as if it is an animal, naming 'him' *Miska*. These two episodes have been both inspiring and reflective, helping to maintain some self-criticism at a reasonable level by not taking everything too seriously while remaining serious in doing so (not being serious). Thus, TV comedy jokes have provided inspiring and useful viewpoints.

Both studies are a parody of BBC nature documentaries of how researchers go to extremes to find a connection with rare species and fellow researchers. This study aims to achieve the same, by looking into how crew and passengers behave in the cases of *Suomenlinna II* and *M/S Viking Grace*. Why does the vessel eat the passengers and dump them on the other side? What do passengers or crew do during their journey and why?

² Neveneffecten Youtube video <https://youtu.be/pEZn1rXWdYc>

³ Studio Julmahuvi Youtube video <https://youtu.be/Qko3SzoqsnQ>

Seeing the research subject from a different perspective in a more experiential way helps to develop better stories that people can relate to. This goal is not too technology-driven but instead tries to find a meaningful link between technology, vessel, passengers and crew, which is done through addressing experiences through stories (Hassenzahl, 2010; Halfon, 2007). Without addressing experiences people are left puzzled to unravel what to do with a certain feature and how they should experience it. (Hassenzahl, 2011)

METHODS

The chosen methods for this research and design project are structured following the Double Diamond (fig. X). The Double Diamond is a design process model mapped out by the British *Design Council* (2007) in 2005 and helps to communicate the communalities of creative processes. In the spring of 2017 during the Experience-Driven Design (EDD) course at Aalto University, the Double Diamond was introduced also as a successful method for experience goal setting by Professor Virpi Roto. This model is especially useful as a structure to tackle the two challenges within Experience Design (XD): 'to determine what experience to aim for, and the second is to design something that is expected to evoke that experience' (Desmet & Schifferstein, 2011, as cited in Lu & Roto, 2015, p. 101).

Also seen in Kaasinen et al. (2015, p.987) is that in addition to understanding the phenomena also scientific knowledge on human activity and underlying values is required. Furthermore, there needs to be a match with the brand and the opportunities and challenges of technology to create a vision (ideal) future scenario. Together with co-creation this process helps produce radical design ideas and solutions (Wahlström, et al., 2016).

The double diamond is used to outline the planning and also for the implementation of the project. The process is familiar, useful and also enables clear visual communication of what is going to happen during the project, and what is the current phase at a given time.

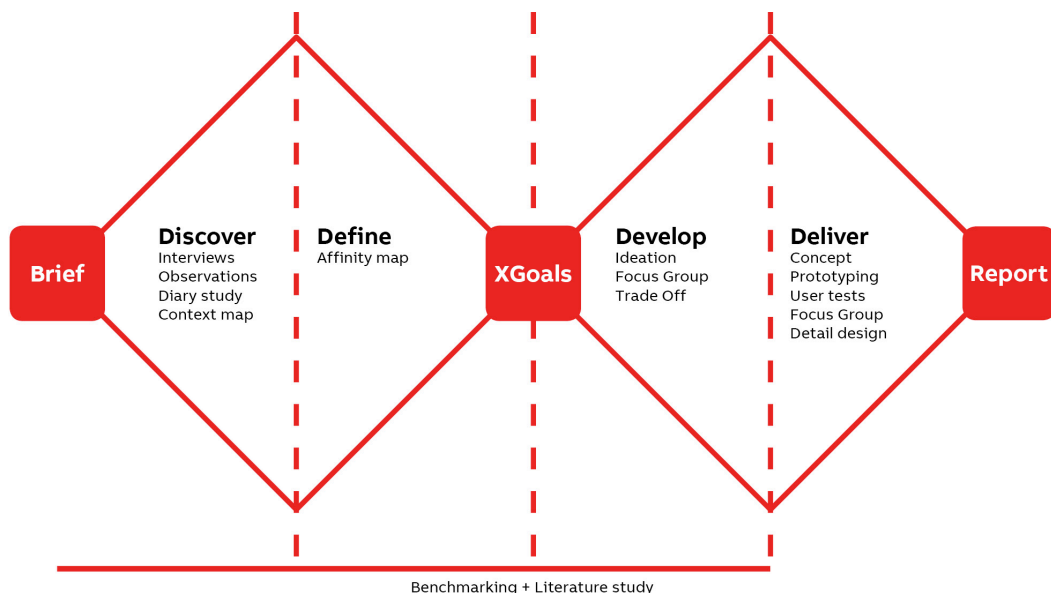


Figure 6. Double Diamond process

The Double Diamond sketches out the different phases but not the methodology. The tools and techniques used in this project derive from Product Service System Design (PSSD) by Ivo Dewit et al. (2016). They

are utilised in order to gain a deeper understanding of people in the ferry and cruise context. These tools and techniques are utilized in Service Design, but are not limited to it as they are used in various other fields of study too. They are mainly utilized to create, maintain and communicate an overview.

BRIEF

The goal of the project is to find new usage scenarios with *PV* to enhance the customer experience. Thus, in the first diamond of the double diamond process, an answer to the first sub question is given (Which transit experiences do people have?) This leads to Ferry & Cruise Experience goals setting, which are used in the second diamond to answer the second sub question (how can an adoption of *PV* enhance the transit experience?)

DISCOVER

The discover part of the double diamond refers to the stage where the people within the context, related artworks and research are analysed. For this part it is important to diverge and see which possible different directions are possible.

People during the transit were observed during daily commutes and multiple back-to-back ferry rides on *Suomenlinna II* and a cruise voyage with *M/S Viking Grace* to Stockholm, Sweden. The observation focused on the people's behaviour, which objects and artefacts they use, and in which locations they are. During different ferry transfers and daily commutes observations were made and noted down briefly or documented by camera.

In addition, in-context interviews of passengers and crew were conducted on the *M/S Viking Grace* and *Suomenlinna II* to gain a deeper understanding of the viewpoint from the stakeholders involved. *Suomenlinna II* was chosen as it is part of the case route and thus it provides more direct data linked to a short transfer. However, the short travel time also limits the possibility to have longer in-context interviews. In order to gain a better picture about ferry and cruise transit, an additional diary study was conducted with locals on *Suokki* (older ferry that does the same transit) and *Suomenlinna II*. Furthermore, additional interviews were conducted on *M/S Viking Grace* to see how the end result can be scaled up in size, time, distance and audience. On *M/S Viking Grace*, the interviewees were selected through a contact person. The questions for both the expert and passenger interviews together with the transcriptions can be found in appendix 2.

Also crewmembers, the first mate and captain of *M/S Viking Grace* were recruited and interviewed. The chief engineer and an engine room controller were also interviewed but more briefly and in a less structured manner. *M/S Viking Grace* was chosen for various reasons.

The trip is sufficiently long and it was possible to conduct the crew interviews along passenger interviews and observations.

Afterwards a diary study was conducted with locals from *Suomenlinna* to get an understanding of transit experiences that stretch over time and multiple journeys. In this cultural probe (Mattelmäki, Lucero, & Lee, 2016), the participants reflect on their transit habits and experiences for seven days. The use of the diary is first explained followed by a short survey. The daily assignments in the diary stimulate different perspectives on a ferry transit in all its aspects, taking and missing a ferry. At the end, there is a survey for the participants to reflect on the past experiences. *Travel Anywhere* card deck by Falck (2014) is used for some of the probing tasks and questions, such as “Look behind you [...] these are your surroundings” and “What will you remember [...] forget about this place?” (See Appendix 2 for a full overview of the diary)

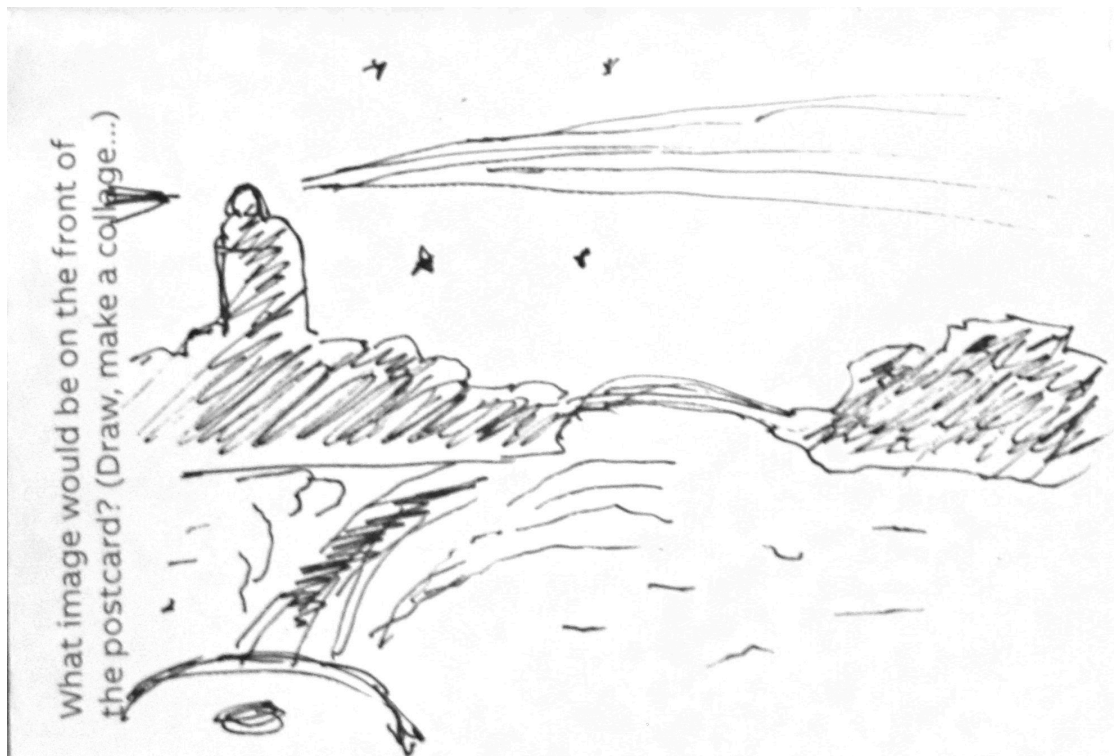


Figure 7. Diary entry

From previous experience (Provoost and Dewit, 2016), using diary study is fruitful. It is fast to set up and execute. The trickier part is recruiting sufficient amount of participants and the response rate within a given time frame. A diary study was chosen to be conducted rather early in the process, as it requires some time to transcribe, analyse and follow up. For the diary study participants were recruited through Facebook, via help of a local Facebook group, as daily commuters or expert users of the *Suomenlinna* ferries were the target audience.

The in-depth interview of the diary study participants clarified beliefs, argumentations, vision, opinions, behaviour and experiences with a focus on the Suomenlinna ferry transit. The in-depth interview of the diary study participants was semi-structured, enabling analysing the patterns of the different diaries. The participants were interviewed in person in environments familiar to them.

DEFINE

From all the different research methods a variety of insights surfaced and were processed towards an Experience Ideal. This convergence process was done via Affinity Diagramming. Some further methods, such as Personas, Moodboard and Rich Picture (Dewit et al, 2016) were considered too but they were not found adequate to this process.

The observations, diaries and interviews were summarized, formatted and coded in a thematic analysis, focusing on expressions related to transit experiences. Affinity diagramming (Lucero, 2015) was used to find links between different insights. The most important ones are discussed for each category.

Building on the analysis of the affinity diagram, experience goals are set together with a future ideal for cruises and ferries experiences. These are the goals to be achieved during the next diamond in the Double Diamond process, forming the second 'brief'.

EXPERIENCE GOAL SETTING

The ultimate goal is transformational experience (Hassenzahl, 2010) as that has a lasting change throughout people's lives. To design for experiences, it is best to set experience goals, which are most likely to find radical new experiences while applying the same technology.

DEVELOP

Here the experience goals are used to guide the ideation and design process of different concepts. The purpose is to generate as many as possible solutions.

Several concepts are created through ideation toolkits to get different perspectives addressing the different experience goals, while matching them with *PV*. First, obvious ideas are generated after which new concepts are formed focusing on the experience goals and findings from the field research.

For evaluation, a focus group is set up, with a group of experts in the field of design, marine technologies and business, focusing on the ideal, process and results of the concepts and experience goals. Already available solutions are also presented and evaluated so that the expert group understands both the width and the depth of the research. The obvious and often existing concepts also help to illustrate the possibilities and different perspectives.

Afterwards, the concepts are evaluated based on the feedback, the experience goals, the utilization of *PV*'s sensor data and the scalability to be implemented for other applications in a trade-off. As a result, the concept "*Rocking*" was selected for further development.

Finally, the concept story is further developed and prototyped for evaluation and testing. The prototype is not a final version as its function is merely to provoke a reaction from people during different tests in order to gather their reactions to it while the concept is still under development.

DELIVER

The prototype aims at answering the third sub question. The *Rocking* concept was tested on its experiential level, and also its different implementations were checked and validated with passengers, crew and experts. The experience goals were evaluated based on how they are achieved and if they contribute to an enhanced transit experience.

The prototype was evaluated with passengers on the ferry with structured interviews to get a better understanding of how people react to the installation. Different research tools were applied to achieve a deeper understanding of how passengers perceive the concept of *Rocking* and to which extent the experience goals are achieved.

First, the passengers were introduced to the prototype with a short scenario. Then they were asked what it does for them and what it reminds them of. Afterwards they evaluate the prototype using MAX (Cavalcante, Rivero, & Conte, 2015) and AttrakDiff (Hassenzahl, Burmester, & Koller, 2003). AttrakDiff is developed by Hassenzahl, Burmester and Koller and is based on their research in the field of interactive products and software.

With the help of the word pairs please enter what you consider the most appropriate description for **Rocking concept**.

Please click one item in every line.

human*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	technical
isolating*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	connective
pleasant*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unpleasant
inventive*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	conventional
simple*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	complicated
professional*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unprofessional
ugly*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	attractive
practical*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	impractical
likeable*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	disagreeable
cumbersome*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	straightforward

Figure 8. AttrakDiff first 10 word pairs of the total of 28

The first tool that was utilised is AttrakDiff (Hassenzahl, Burmester, & Koller, 2003) for seeing how the concept scores on a hedonic and pragmatic level (both experiential and practical). First people were asked to evaluate the Suomenlinna II ferry and after that they were introduced to the concept and the people evaluated the implemented changes of introducing the concept. Recruitment was done on the spot

and time limit was 15 minutes, the duration of a Suomenlinna ferry transit. As AttrakDiff assesses a reflection on an experience and not the experience itself, the experience goals are evaluated in a second tool, MAX.



Figure 9. Adjusted MAX board

The Method of Assessment of eXperience (MAX) was utilised to get a better understanding on how people perceive *Rocking* on the intended experiences, which it was designed for. A modified version of MAX was used for the test as the purpose is to test the experience goals specifically and not the usefulness of the concept. Each scale comprises different levels of intensity.

In addition to the passenger evaluation, a scenario of the concept was showcased in the remote control room of the simulator at ABB M&Ps premises. The intention is to evaluate and promote the solution and thus get the different people within intelligent shipping motivated to back the solution and develop it further. Furthermore, the purpose is to get it built in real scale both for remote control room and on *Suomenlinna II* ferry. The focus group is also used to see how design processes can be done within ABB more generally and to broaden the view on how technology can be adopted for different purposes.

In the end a more detailed design is proposed with adjustments according to the test results.

DISCOVER

This chapter looks into related work in research literature, technology and art. The aim is to find out how experience design and ferry and cruise experiences have been studied before. By benchmarking, the target is to see what is available on the market and what is done in art already.

THEORETICAL BACKGROUND

The project exploits various viewpoints and fields of study: Design practices and related research of transport, such as cruises, and autonomous vehicles.

EXPERIENCE-DRIVEN DESIGN

There are many types and definitions of experience design as there are many practices that fall under experience design, with each in its own type of experience. To name a few, there are User Experience, Customer Experience, Employee Experience and Brand Experience. However, this project applies a human-centred viewpoint, not differentiating between these various approaches, but studying people as a whole. As Don Norman (2006) states 'Words Matter. Talk About People: Not Customers, Not Consumers, Not Users.' Therefore, it is useful to talk about Experience design. The focus is not on looking at the different states people take during their journey, as they are at some point users, customers, employees and so forth. The goal is to personify them as real living, breathing people, humans, who have specific goals, motives, agendas, abilities and social structures (Norman, 2006). A passenger is also a father, husband, son, cyclist, hunter, friend... In addition to studying people in context, Hassenzahl (2008) argues for using cumulated proven theoretical models of understanding human needs.

Experience-driven design (EDD) provides this holistic view, as experience goals can be set through studying various approaches to acquire insight and inspiration. Kaasinen et al. (2015) proposes five approaches: Brand, Theory, Empathy, Technology and Vision. First, the *Brand* approach sources inspiration from the company and brand identity to ensure that both experience and image are in line. Secondly, the *Theory* approach is based on scientific understanding of human behaviour. However, the theory needs interpretation related to the context and brand as the theoretical models provide many alternatives. As a result, the *Empathic* approach is required to provide the understanding of the people involved and to see the context from their perspective. In addition, the *Technology* approach considers the possibilities and challenges influencing the experience through the new technology. Finally the *Vision* approach introduces insights from other fields of study where certain experiences are already achieved and are desirable for this case to justify its existence. Following these five approaches allows keeping an overview of the possibilities of *PV* in the context of ferry and cruising experiences.

To sum up, the holistic approach has been chosen in order to involve all the possibilities and keeping the focus wide. The goal is not to focus on one aspect of *ABB M&Ps* or *PV* but more on the people who will be involved and which experiences they will be offered, that match with the brand, theory, technology and a vision (to avoid confusion with *Pilot Vision*, vision will be called ideal hereafter).

WHY? WHAT? HOW?

To design for experiences and define experiences, the right question is not '*How is this done?*' As Hassenzahl (2010) puts it, one needs to answer questions *Why*, *What* and *How*. By finding answers to these questions one can design for experiences using technology for the right reasons (Hassenzahl, 2010). Moreover, as Hassenzahl explains, these questions have to be asked in this order. The *Why* needs to prioritize over the *What* and the *How*. Too often the *What* is answered first and only later the *How* and finally the *Why*.

Thus, in this project experience design starts from the *Why*, preceding the *What* and *How*. The aim is to create products that are sensitive to the human experience and to tell stories through their use or consumption. Moreover, the focus is on differentiating and trying to achieve a lasting change within the user.

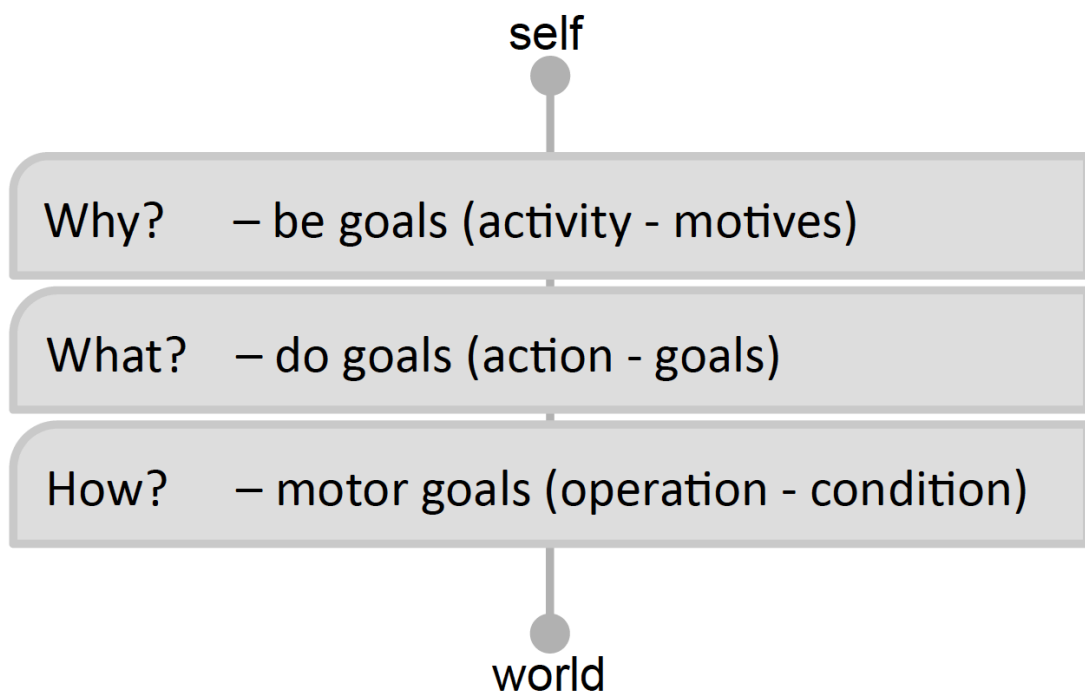


Figure 10. Model by Hassenzahl (2010)

The *Why* includes the needs and the emotions setting the tone. The goal is to find these needs and try to fulfil them through the offering of a product or service. Answering the *Why* question helps to reflect upon underlying needs, emotions and associated practices. Needs cover a set of experiences and have no direct priorities over one another

(Hassenzahl, 2010, p. 55). They can also be understood as be-goals (Hassenzahl & Roto, 2007), ways people want to be. Wiklund-Engblom, Hassenzahl, Bengs, & Sperring (2009) give a selection of six universal psychological needs that can lead to positive experiences when fulfilled: *Autonomy, Competence, Relatedness, Influence (Popularity), Stimulation* and *Security*. Later *influence* is renamed to *popularity* and *meaning* is also added to the list (Hassenzahl, Diefenbach and Göritz, 2010). Desmet (2012, p.4 and p.8-11) builds on these and uncovers 25 of the underlying positive experiences related to but not limited to these six basic human needs. This theory provides a scientific base from which alternatives can be selected (Kaasinen et al., 2015).

The *What* are the things people achieve through interacting with a product. The idea is to find the goal that is possible through a product's functionalities, such as making a phone call, write a message, play music and so fort. The do-goals will be achieved through what activities the concepts allow people to do on the ferry and or cruise.

The *How* looks into the acting or actions needed to achieve the goal, on an operational, sensory-motor level, such as pressing, grabbing, dragging, closing and so fort. It is very tied to the actual product and its context. A good tool for answering the *How* is interaction goals (Diefenbach, Lenz, & Hassenzahl, 2013).

The Why and What form together *an experience*, the in-depth meaning of the actions for the person, while *the What and How* form together *experiencing*, the interaction quality with the world around a person (Hassenzahl, 2008). It is thus important to think, "Experience before Product" (Hassenzahl 2010).

Another field of study within design aiming to have a holistic approach is service design, which is mainly about experience alignment over the different touch points through which a consistent and desirable customer experience can be generated. Service design highlights seeing the bigger picture, finding out what can be achieved and where solutions can affect the users. Some of the tools of service design are utilised and Dewit et al. (2016) provides a variety of tools that are helpful to generate, keep and communicate this overview.

Hassenzahl (2010, p.8) defines an experience as: "an episode, a chunk of time, that one went through, sights and sounds, feelings and thoughts, motives and actions closely knitted together, stored in memory, labelled, relived and communicated to others." which highlights time, motivations, actions, feelings, thoughts and senses as important attributes of building an experience.

The article "*It is more fun to commute*" (Hassenzahl, et al, 2016) showcases the experience goal driven approach. It provides a useful overview of which experience goals can be applied in commuting for enjoyable and meaningful activities: predictability, security, time for contemplation, privacy, spontaneity, stimulation, time for others, conversation and togetherness.

FERRY AND CRUISE EXPERIENCES

Within literature the experiences on board of ferries and cruises have been studied to some extent in different fields such as tourism (Radic, 2017), music (Cashman, 2014), design (Ahola, 2016) and city planning (Kruskopf, 2017; Douglas, 2017). The experiences uncovered range from perception of safety (Markus, 2016), value (Douglas, 2017) to motivations (Cashman 2014; Radic 2017)

Approaching needs tells where motivations, emotions and meaning come from (Wiklund-Engblom, Hassenzahl, Bengs, and Sperring, 2009). According to Markus Ahola (2016) the most important experience is safety. In his study the focus is on the safety perception. But as Roto (2017) states, safety is linked to the usability level of products and services. Usability level contributes to avoiding dissatisfaction while the other be-goals drive motivations. Safety does not contribute to enjoyment and meaning as such.

Ferry experiences are somewhat neglected within research and practices as they are seen as mere commuter vessels for short distances (Kruskopf, 2017). Kruskopf has looked into future autonomous city ferry services in the Helsinki Archipelago, highlighting a digital service solution but not focusing on experience goal setting.

The impact of the physical environment on the experience has been defined in the servicescape concept by Bitner (1992) a measurement scale based on three dimensions: ambient conditions (weather, noise, music, odor), space function (lay-out, furniture and equipment) and signs (signage, symbols, personal artifacts and style).

Huang and Hsu (2010) defined cruise experience as the psychological outcome of a cruise vacation leading to a four factors scale to measure the cruise experience. While Satta, Parola, Penco, Persico and Musso (2016) have distinguished six motivational factors to distinguish six different market segments in the cruise industry.

Huang and Hsu (2010)	Satta et al. (2016)	Hassenzahl et al. (2010)
Learning	Culture and discovery	Meaning - stimulation
Self - reflection		Meaning
Relaxation	Escape and relax	Stimulation
Family reflection	Family bonding	Relatedness
	Accessible all-in-one package	Stimulation
	Prestige and social recognition	Influence
	Advice and emulation	Relatedness + influence

Table 1. Cruise motivations matched to psychological needs.

Experiences are evaluated on their positive and negative influence on the 'cruise experience' (Radic, 2017) but the underlying psychological needs are not addressed or uncovered providing only incremental innovation (Kaasinen et al., 2015). The service has a strong and lasting influence (Juan and Chen, 2012) but what is it actually made of? Service is a broad concept and it is not clear what are the parts that helped to enhance a cruise experience.

One of the places of interest within ferry and cruise transit is non-places. These are places that have no organic society (relations) or history (Augé, 1992/1995 p.112). Waiting areas such as ferry terminals are the perfect example of this. This location provides a lot of opportunities as people are spending time here while no identity or history are present as they are non-places. Rites of passage are methods that can be fruitful to bring meaning to these places. Non-places is where people lose their identity and form multiple relations without history.

SENSES

Stimulation is a basic human need (Wiklund-Engblom, Hassenzahl, Bengs, & Sperring, 2009). Hence, addressing senses is important. All of the senses are addressed on cruises (Tynan & McKechnie, 2009, p.509), which, according to Cashman, make a cruise trip (2014, p.89) a very rich experience of which music is an important part by creating the cruise's soundscape. The most important sense is sight, according to the 'tourist gaze' concept of Urry (1990) while Pine and Gilmore (2011, p.88-92) state that all five senses are readily addressed within cruises. However, they pay less attention to the many other senses people have. Addressing a *different sense* (outside the traditional five of sight, hearing, smell, taste and touch), for instance place and direction (Jacobs, et al., 2013), time or balance and acceleration (motion) can be fruitful in this context. It makes people aware of these 'alternative' senses and how they can be stimulated and used as Provoost and Dewit (2016) has explored.

PERCEPTION OF TIME

Time plays an important role in experiences and, timing impacts the whole travelling experience (Hassenzahl, 2010, p.21). Studying transit experiences requires understanding of how people perceive time and how it can be affected by different tasks and activities. By offering meaning (Uusberg, Naar, Tamm, Kreegipuu, & Gross, 2018) time is perceived longer. Thus, by addressing positive experiences the time is perceived longer though it remains the same and in some way goes faster due to the positive experiences that keep one stimulated and not bored.

Time has been important throughout the history, especially in the era of explorers for navigation purposes (Van Dyck, 2017), to orientate, which was mainly based on the surroundings of the world, the sun and stars. This link to seafarers is striking and should be utilised to stimulate people to stand still in the moment. One example is a map, which is like time, where a snapshot of the whole world is taken to see everything, even the most remote places related to each other within the same moment, as a virtual simultaneity. However, time is relative to the observer who measures it (Hawking, 1988).

BENCHMARKING

This part benchmarks what is done within the technology and innovations related to *PV* but also experiences and artistic approaches related in some way to *PV* are listed. Some might appear far-fetched but they are relevant for the process and to the concepts being developed. The benchmarking process helps to formulate an ideal experience (Kaasinen et al., 2015).

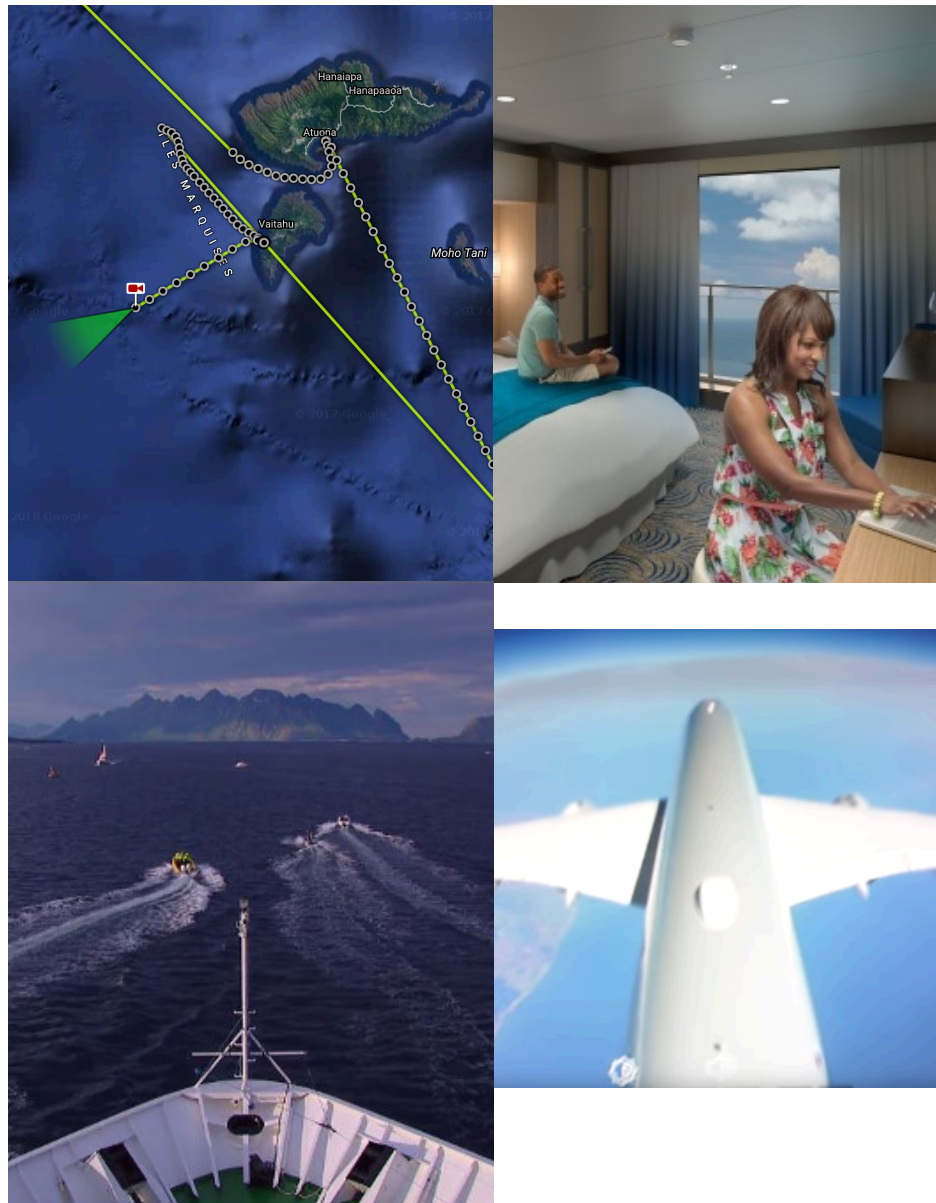
TECHNOLOGY

There are a variety of examples that are accessible by passengers. However, they often use fewer sensors than *PV* and resolve around the use of just a webcam. From cruise ships to even airplanes and trains. One could sign these examples of as obvious Solutions from yesteryear but it is worth to see how different experiences are created through these webcam offerings. There are clear cases of just using technology but not getting to an experiential level (Fig. 11, 12 and 14) as people need to figure out themselves what the experience will be for them.

However there are examples that do create more enjoyment and meaning, such as a time lapse⁴ or 360° video⁵ can be very educational. Though these videos will not be revisited over and over again. One phenomenon that was surprising success to many is the coastal cruise (Fig. 13) from Oslo to Kirkenes and back. Within this concept there is a big feeling of relatedness, as it connects the whole Norwegian Atlantic coastline to one big media event. However, this would lose its meaning if it is repeated to many cruises at the same time. Therefore not possible to be repeated.

⁴ Time lapse <https://youtu.be/AHrCI9eSJGQ>

⁵ 360 <https://youtu.be/xr-mGYerSyk>



Figures 11-14. Webcam Hapag Lloyd cruises - Window Royal Caribbean - Slow TV northern passage - Plane webcam Casey Neistat

A lot of the experiences within cruise and ferry industry feel rather flat as technology is offered just because we can and as a quick gain of a wow-factor or hygiene level, while they do not address experiences or motivations for a longer period of time than the travel itself.

Airline reviews are the theme of YouTube videos by Neistat⁶, for instance. The clip showcases addressing do-goals while be-goals are neglected. The one and only is showing it off, the psychological need for popularity or influence.

These already existing solutions can be seen widely used already in different contexts and they are direct implementations of the technology. There is no translation done towards a more experiential product or service. People often have to figure out a lot about how to

⁶ Qatar Airways A350 Business class review
<https://youtu.be/q0B8k3UPZNc>

experience the technology themselves. Thus, people might feel that they are left on their own. These solutions are fruitful but only to some extent. Nevertheless, it is useful to list the existing solutions to have an understanding of what is done already.

INNOVATION AND TRENDS IN TRANSIT

Within the marine industry many players, from big corporations to start-ups, are aiming to disrupt the market. Their goal is to innovate on different levels within shipping and operations but the efforts on an experiential level are rather limited. The main focus remains on the industry itself and business-to-business aspects and less on the people on board the vessel. The development is foremost technology-driven and mostly does not cover how people are going to create value beyond the bigger, better, faster, stronger dimensions, except from the educational expedition cruises.

Useful examples of innovations in ferry experiences are hard to find. However, recently there has been some interest in addressing them. For instance the City of Helsinki is preparing a strategy for Seaside Helsinki⁷. Helsinki's seaside location is part of the city's fundamental nature and appearance. This dimension has not been sufficiently utilized as an attraction factor for the city (Kruskopf, 2017). The aims of the city's strategy are to improve the accessibility of the city's marine sites and the services of the archipelago as well as to promote seaside events.

A ferry trip can be seen as a travel mode but also as a mobility service. The concept MaaS, Mobility as a Service (Ministry of Transport and Communications, n.d.), helps to understand mobility not as a single travel mode or a vehicle but as a service allowing mobility, preferably from door-to-door. Instead of owning a vehicle, the passenger is provided a service. There is no ownership by the passengers - how can this fact support their experiences?

Alternative means of transport were also studied through observations. They include train, tram, metro and bus rides as well as airplane flights. These are mainly based in and around as well as from and to Helsinki. In addition, inspiration was also found in and on the way to Milan, where a remotely operated metro, planes and trains provide valuable insights.

Different transport modes lead to diverse experiences while people share the same needs on board these means of transport. The key focus is on how the surroundings are experienced.

⁷ Call for proposals, open until 15.03.2018

<https://www.hel.fi/uutiset/fi/kaupunginkanslia/kerro-ideasi-merellisen-helsingin-kehittamiseksi>

When on a flight, one cannot see much around. A little boy on the aisle seat was seen having hard time trying to get a glimpse of what is outside the plane. And if one manages to have a window seat, there can be the obstruction of the wings, the problem of being on the wrong side to see the hotspots or blinding sunlight. Trains are similar to ferries in the sense of space and view to the surroundings.

The autonomous metro in a tunnel is mostly boring, with few bends in it, the tunnel being fully lit and all there is to see is concrete and the lights. However, this further view allows people to rest their eyes and look 'outside'.

The newly installed fences along HSL metro in Helsinki stimulates dizziness as it blocks the view, not showing the eyes how fast the metro is going, having only a few exit ports introducing some stimuli suddenly, confusing the sense of motion.

Like public transport today, autonomous vehicles in the future will allow the driver to focus less on the act of driving, which makes that person become a passenger instead. As the passenger in autonomous vehicles is an essential future target audience, the research about their possible transit experiences has been covered in many recent studies. The most interesting example of them is the EVE concept car by Nio⁸ as it addresses a multitude of psychological needs, such as relatedness, autonomy and stimulation. In addition, it addresses positive experiences, such as enjoyment, assurance, optimism and gratification. The most significant need embodied within this concept is meaning. Nio enables experiencing a car as if it is a living room, and the need for speed and going faster disappears.

ARTWORKS

Within the field of Art there are many promising implementations of technology that support universal psychological needs and positive experiences. The following inspiring artworks stand out and make a statement. They provide a transit experience of some sort, be it physically or cognitive.

Weather Followers⁹ by David Colombini is perhaps most linked to the project brief. It uses sensor data and thus brings serendipity to one's digital life. The weather instruments send a drawing in the wind direction, glitch or erase data according to the air pollution or sun intensity and plays music on the rhythm of the rain. The project plays with surprise, humour and awareness about the elements where people have no control over. The surroundings are emphasized, whereas people might have otherwise ignored them.

⁸ Nio EVE <https://www.nio.io/visioncar-experience>

⁹ Weather followers www.fragment.in/project/the-weather-followers/

Obscuraboat and -bus¹⁰ are a boat and van based cameras obscura that bring the surroundings totally present within the vessel and vehicle. This is very strong way of connecting to the surroundings and making it available to the people. They stimulate, inspire and connect people.

Tele-present water¹¹ by David Bowen is another inspirational artwork where the connection to the location is made through an installation showing the exact movement of the water surface. While people are not included it gives a relatedness experience to the location it is connecting to.

*Atlas of Remote Islands: Fifty Islands I Have Never Set Foot On and Never Will*¹² by Judith Schalansky is an intriguing way of teleporting oneself through stories and simple images. The introduction chapter on how she travelled through using an atlas as a child is the most inspiring and simple stimulation of merely using a top view image to dream away to another place.

One inspirational activity of a ritual transit is Spew Bag Challenge¹³ by Gemma O'Brien. The idea is to draw on a spew bag for the duration of the flight. The challenge is to come up with a graphic and fun quote for a given time frame. One is limited with the given tools and space of an aircraft, promoting self-development.

Another track of thought through art history can take LiDAR as a starting point. LiDAR is a point cloud used to form an image. The same is widely seen within Kinect and other depth applications. A much older version is pointillism paintings, where points form shapes within an image. Similar styles occur also within tribal art and pop art has it dots. A more recent example of this abstraction of landscapes and nature can be seen in Amok Island's work¹⁴.

CONTEXT MAP

The context map shows the rich environment where ferries are. First, the focus is on people, who are within the target audience and those who buy a ticket for the ferry or cruise. The aim is to define what is actually involved within the context and to decide on whom to focus. To get to this conclusion a few questions were asked: Who is involved? Which activities do they do? Which locations do they encounter? What schedules or time slots are present? Which artefacts are utilised along the process?

¹⁰ Obscurabus www.obscurab.us/

¹¹ Tele-present water vimeo.com/41579089

¹² Atlas of Remote Islands red-dot.de/cd/en/online-exhibition/work/?code=06-1718&y=2011

¹³ Spew Bag Challenge spewbagchallenge.tumblr.com/

¹⁴ Collaboration by Amok Island and Jarrad Seng
www.amokisland.com/exhibition-1/



Figure 15. Context Map

In the context map the focus is already on the customers' customers or the people on board the vessel, as ship wharfs and owners are seen as the direct customers of ABB M&Ps.

The context map points out the different categories and highlights the schedules involved. A key finding is that often passengers wait for the *Suomenlinna II* ferry longer than the actual time on board the ferry..

The main groups of people on board the vessel are passengers and crew. Passengers' goal is to reach a destination but there are more goals linked. The additional goals were uncovered in the interviews, diary studies and observations. There are mainly two groups of passengers on board, locals and tourists. As locals are more frequently on the ferry and have more outspoken opinions, it is more interesting to focus on them than on the tourists. Crew goals are to navigate the vessel across safely but also for them there is more to it than that.

CONCLUSION

According to the literature review and benchmarking process, there is a gap in research of ferry and cruise experiences. To fill the gap, experiences need to be seen on a scale, noting that they come in a pair with their opponent and there is a scale in between them, by and large, experiences do not follow dichotomies, and people often want to have a variety of experiences, linked to their needs and goals. Iso-Ahola (1982) points this out in that sense that people look for familiar and new things, which is the best approach and how experiences can be tweaked. Not going to an extreme of one certain experience allowing the combination, choice and mix of different experiences, resulting in passengers being able to cherry pick according to their own interest.

The cruise industry provides a wide range of products and services and appears to have tapped into experiences extensively. Nevertheless, there is still a significant potential available as the current on board activities are all available on shore already. Especially ferries are seen very practical while it has remarkable hedonic potential (similar to autonomous vehicles as stated by Hassenzahl et al., 2017) as a different means of transport to give meaning to people's transit.

DEFINE

This chapter presents the results of the first diamond: diary studies, interviews and observations, and answers the first sub question: which transit experiences do people have? The findings are then further elaborated and interpreted to set the experience goals and finally applied to the concept development.

In the thesis it is explored whether *PV* data can have a greater impact from a commute to a pleasure ride. While a commute is a particular use case, commuters can also benefit from improvements significantly in their daily lives. Moreover, solutions that work for commuting can be scaled to longer transits, providing something special and being relevant for other types of transit too.

AFFINITY DIAGRAM

Combined material - interviews, observations and diary study – shows certain categories emerging. The following six different categories arise most clearly, their titles being somewhat general, but pointing to the underlying dynamics and what is specific to Ferry and Cruise transit experiences.

In figure X the six categories are listed, together with the findings related to for crew (darker shade) and passengers (lighter). The affinity diagram is a simplified representation and some of the findings are linked to multiple categories. Categories were formed according to the clearest and most outspoken links.

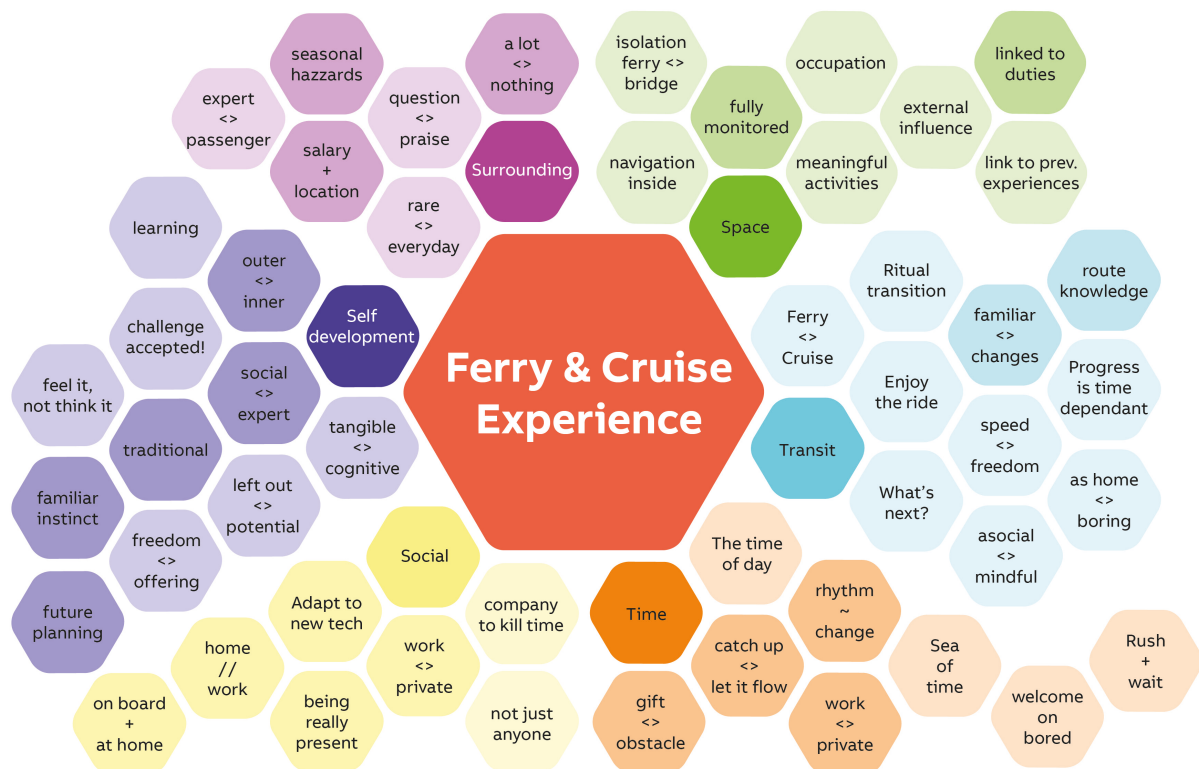


Figure 16. Affinity diagram, darker is for crew, lighter is for passengers.

TRANSIT

Perhaps the most obvious category of all is *transit* in itself, moving from 'place A' to 'place B' using a certain means of transport. For a given transit experience there are a variety of defining perspectives that have an influence on it. The main perspective is the mindset of the passengers. There is a noticeable difference in behaviour of people and how they do activities outside of those offered by the vessel itself, coming up with activities themselves. Locals find their own ways to pass time: 'I do my handicrafts here as if I'm at home on a Friday afternoon, plus I can observe people around me' or 'I try to find a quiet space to study.' On the contrary, tourists rely on the activities offered on board.

Furthermore, the mindset allows people to make the transit into a ritual. For some a ferry transit is a clear border and a mental relief: 'Leave things behind, it is like a cathartic experience to me.' It is also a way to define mentally where you are physically 'Check on myself, that I have my soul with me. I take and send a picture to my family when I leave so they know it [that I'm leaving]. Then I know I have everything [myself, my soul and family] with me.' Locals of Suomenlinna see the ferry as an extension of the island in addition to 'A crucial transit to possibilities, a sea-line to the city' and a place to reflect 'you just have to sit down and think ... my thoughts start flowing.'

Observations showed that the engine vibrations on the ferry have a strong influence on people. As the vibrations increase towards the end of the transit people automatically stand or even wake up. However this end of the journey can be postponed, by bad weather.

For the crew the experience of transit is different. For them the transit revolves mainly around route knowledge and changes. They know the route and all its details. Thus, small details and differences are ignored if they are of an aesthetic beauty. Familiar parts are nice but can get boring. The same goes for changes, as they can be very stressful while otherwise also making the transit more interesting. To make time go faster it is nice to have some changes and be challenged to deal with them. In conclusion, the crew is mainly focused on safe navigation and saving ... time.

TIME

Time is also perceived very differently by crew and passengers. The time experiences stretch over a scale from *gift* to *obstacle* at the extreme dimensions.

On one side, there is a *gift* for passengers to *let time flow* 'I went to the map with lights on board of the Stockholm cruises to see how much time we still have left on board' and relax 'I let everything else wait' as they have *a sea of time* 'It is a moment to reflect'. Passengers want to have the time pass slowly and have a good time. Crewmembers have a similar experience in their spare time 'This is time for myself'. In

particular, time is seen as a gift when the crew for example manage to save time in a manoeuvre.

On the other end of the scale where time is an *obstacle* the difference between crew and passengers is more tangible. Here, passengers experience time as a burden: there is too much time and they do not know what to do with it, *Welcome on Bored* 'Food can help as a change'. In contrast, crewmembers experience that there is too little time. For them time is a bottleneck resource of the trip as following the schedule and catching up on time if needed is most important 'If we are 15min late the newspapers would write about it' so 'We leave when we are loaded, the advertised departure time is the latest we can leave'.

For both groups, there is the experience of *Rush and Wait*: time is first limited towards a deadline followed by a period of no activity. Thus, this contrast moves the perception of time as a resource completely the opposite direction, from limited and valuable to abundant and meaningless 'I was in a hurry so I forgot my headphones and now I can't use them'. There is a switch in the time perception, though the experience remains on the same end of the scale, time being an obstacle. Every so often passengers grab for their mobile phones to spend time.

In the end, a faster transit mode costs time too, while letting time pass by is seen as a pleasant and relaxing feeling. The voyage has a schedule that is based on time and ... location.

SURROUNDINGS

Regarding the experience of the surroundings varies more than other categories between the crew and the passengers. While for the crew the surroundings of the vessel is their expertise: *'I have a certificate that shows I know the route, everyone on the bridge has this.'* it is unknown for both locals and tourists *'There are no clear names, like on roads, they (islands) are so similar.'*

For local passengers the surroundings are still a mystery, *'I would like to visit those islands'*, which they want to unravel, *'I can just stare and try to guess'*, praise. *'This is really nice! Oh .. my .. gosh!'* or recommend *'In autumn it is really nice! Violet colours of flowers! Not now though.'* While tourists question the surroundings *'Does the ferry operate in winter?' 'It must be horrible in winter time!'* and locals have a response ready *'You should see it when it is all frozen over in winter, totally different from now'*. Though they sometimes find it hard to go outside *'I don't like the wind, maybe in summer when it is hot'* and tell the difference on a daily basis *'You are really one of these spiritual masters that can live in the present moment and see everything fresh around you.'* Locals grow used to it over time and do not always see the changes in the surroundings.

For the crew there is a lot happening in the surroundings or there is nothing but sea or darkness to spot. The surroundings change mainly over the seasons; during summer with sailing boats which is beautiful,

but during winter and autumn, ice and storms respectively make it harder to navigate, while training the skills of the crewmembers.

SELF-DEVELOPMENT

Developing capabilities and skills *en route* is a category where crew and passengers have a lot in common. The most significant transit experience listed here for this study is how people recognise how they develop themselves while the surroundings do not follow in development. Passengers develop new needs that are not addressed on board though they see potential around them to 'study'. For crew, they are doing effort but the harbour surroundings are not following '*Vessels keep growing bigger but the harbours do not always follow this development*'.

Another important experience is how the transfer is a part of a bigger journey, an important step but not a stand-alone experience. There is no end destination and passengers are already looking for what is next. However, ferry journey provides an opportunity to find new perspectives to life and plan for the near and distant future, to grow in life and professionally, as there is the freedom within the space.

SPACE

For the crew, the internal space is mainly linked and organised to their duties. The places to relax are tucked away from sight and under the sea-level.

For passengers traveling, space and possible activities are limited, the faster one travels the more space is limited. Ferries offer a lot of space compared to alternative transport modes, resulting in an increased level of freedom. With an increased freedom people see more possibilities. However, transport models vary: though a car has little space, one is in control where to go. So a ferry connection is considered restricting the freedom compared to a bridge crossing: '*I would feel more like a prisoner with only a ferry connection, the bridges to Lehtisaari make the island feel less of an island.*'

It is important to both crew and passengers to know how the space is used inside the vessel. For the crew the locations are solely duty dependant and very practically divided. For passengers, the seating directions have a strong influence on how they experience the space 'The seats facing outwards might be more efficient way to sit but it doesn't feel cosy' and which activities are offered on board. As there is still a limited amount of space it is important to notice how the space is occupied. Space can be occupied with or lack of music, coffee, noise, objects, sun, wind and ... people.

SOCIAL

Social life on board a ferry and cruise is important in both cases, Suomenlinna II (locals) and M/S Viking Grace, as people are on it for a while or see each other often. The fastest way to kill time is through company and talking about things, finding new things exchanging ideas,

... However, not every stranger is welcome to join company, even friends are avoided at times, 'I want to have the choice to sit down with my friends or not, but even if there is a place I choose not to join them. If I don't have the choice I feel left out.' It depends on the passengers' own state of mind and mood, if they are open to talk or not. And obviously also the other people need to be taken into account. Sometimes they might happen to have too different interests.

In relation to the crew, staying in touch over a distance has become easier as they have adapted to new technology to stay in touch with their family. This is especially important on a cruise ship where work shifts are long.

In the case of Suomenlinna II the seating position is worth mentioning: the rows have an influence on the transit experience both on the space and social categories. While on *Suokki* (other ferry that operates between Kauppatori and Suomenlinna) the seating booths allow different social circles, defining the size of the group one can have an intimate conversation with. "When you are facing each other ... yeah a booth. You can talk with people"

How to stimulate people to interact with each other, be curious, inspired...

WHICH EXPERIENCES DO THEY HAVE?

To conclude, the main cause for different transit experiences is the mindset towards the transit itself that people have on board a vessel, independent of the transit mode (e.g. Hassenzahl et al. 2017).

For example people search for activities during transit as otherwise they would feel bored. Tourists find activities more easily but for locals it is harder, as their standards have risen (Risitano, Sorrentino & Quintano, 2017, p. 303) and they have got accustomed to the surroundings. Therefore, in addition to activities offered by the ferry or cruise, locals approach the transit in a ritual manner. The self-initiated rituals provide a more meaningful pastime, as people otherwise experience time to be abundant, long and boring or limited, short and stressed. These rituals are strongly linked to self-development, both on a cognitive and physical level. Passengers are looking for what is next and they experience the transit as part of a longer journey (in life), gaining new perspectives. This type of experience requires space so that it is possible to get into a flow state of mind without disturbances. However, the space within the ferry or cruise is often occupied with too many stimuli, while the surroundings are a vast space of freedom. In addition, the surroundings can be anyhow a source of mystery, ready to be unravelled - though it is demanding even for the regular passengers to notice the variation between each trip. Over the course of a trip people connect to each other by being in the same space, showing the same interests. A vessel is a meeting point (Rantala, 2003) where people unite with each other, the vessel and the surroundings.

As noted above, locals have grown used to the transit which makes the surroundings less interesting to them. However, they anyhow maintain an interest in their surroundings, with for instance the North Star on the Quantum of the Seas¹⁵. The same holds true for tourists: As they are new to the place they are even more intrigued by what is surrounding them. By contrast, they do not have the familiar rituals of how to deal with the trip. Here both types of passengers can learn from each other. For locals, a transit could be more as if it was their first one, amazed by the cheer beauty of the surroundings. For tourists, a transit could be as if they know where to look for.

As familiar to many, a one-hour car journey can be a tedious experience for very young passengers. From personal experience, one tool to apply along a familiar route is to know where to look out for, having sort of intermediate goals. What seemed ridiculously long as a child, became shorter by spotting the expected fighter jet and dirt track en route.

¹⁵ The most advanced cruise ship <https://youtu.be/V1rlGILzpeM>

EXPERIENCE GOAL SETTING

As the transit experiences, needs and behaviour of the target audience have been analysed and defined, it is possible to form an ideal future transit experience after which experience goals can be set (Kaasinen et al., 2015) to develop radically new experiences while the same technology can be utilised. The experience goals are the conclusion of the first diamond (research) while they will guide the ideation and evaluation of concepts in the next diamond (design) of the thesis project. As Lu and Rohto (2014) define, “experience goal describes the momentary emotion that is intended to be experienced during use of the product or service or, alternatively, a person’s emotional relationship to the designed product or service”.

TRANSIT EXPERIENCE IDEAL

Based on the insights from the six different categories of Ferry and Cruise Experiences, literature review and benchmarking, an ideal of future transit experiences is created. The Ferry and Cruise Experience Ideal is formulated based on the question *Why* and helps to guide the answers on *What* and *How* when building the experiential concepts. The experience ideal is built on analyzing time, transit, space, surroundings, self-development and social, as these were the categories that stood out earlier in the affinity diagram.

TIME

An ideal transit experience trains the time perception of people in order to master the skill of letting time flow or catch up. Hence, they know how to spend, gain or waste time, allowing them to see opportunities at waiting moments. Consequently, the feeling of rush and wait is turned into an opportunity instead of a burden. Time on board a vessel is not an obstacle of boredom but an opportunity to relax and be Zen, appreciating the given time. As finally, gaining time costs time too: A flight might be faster but you have to spend time to travel to the airport, check-in, security check, board, wait for take-off, etc. All of this has to be done within time and space constraints while a ferry or cruise allows to board sooner and provides more activities on board.

TRANSIT

Ideally, a transit consists of the following elements: a ritual focussing on leaving things behind while maintaining no specific rush to get to the destination, as the passengers go through a physical and mental transition. The transit can be seen already as an extension of the home or work; the same possibilities are present during the journey towards the destination. Work and home remain on their side, while the vessel functions as both a barrier and a link between.

SPACE

The space on board the vessel should be optimised to provide opportunities, possibilities and freedom for passengers to express themselves and reflect on themselves. It is best to connect the interior

to the surroundings of the vessel to benefit from being at sea instead of trying to fake what is already ashore.

SURROUNDINGS

The goal is to bring indirect cues of details from the surroundings inside the vessel in a subtle way to make passengers more observant. By providing different perspectives of what the different people on board pay attention to, the surroundings can be used to show the different people's point of view.

SELF-DEVELOPMENT

When learning one should be pushed to reach further and set new goals when a horizon is reached, there is no final answer. Openness to new things and different perspectives is stimulated for continuous learning, as one is offered challenges and the potential to learn more. This can be done by being critical about one's own opinion and build upon others' knowledge. The goal is to make this a transformational experiences, where one has to *'feel it, not think it'*.

SOCIAL

Finally people on board should be stimulated through *different senses* (Provoost and Dewit, 2016) to feel related with people on board but also over a distance to people on shore. Recognising the otherness to connect respectfully as a group between tourists and locals, let them be what they are, keep them authentic.

EXPERIENCE GOALS

Based on the Transit Experience Ideal, the experience goals are introduced in the following paragraphs. The experience goals (see figure 16) help as guidelines for developing different concepts, and they are all considered desirable experiences. The experience goals are based on the research findings of the different transit experience categories of the first diamond. Furthermore, these findings have been connected with the research by Wiklund-Engblom et al. (2009) and Desmet (2012) that describe respectively be-goals and positive emotions. In addition, the interaction goals based on Lenz, Diefenbach & Hassenzahl (2013) will help to answer the question *How* to achieve these desirable experiences, as outlined in the next chapter.

First of all, a transit is about curiosity. When traveling or commuting people are going to a place to develop more, to meet themselves, leaving a state of mind behind to enter another or to develop one further. During the journey a mystery is built, calling for action and active participation or focus on the self, being reflective and passive participation. This helps to set a relaxed and dreamy environment for people to be free and develop themselves in harmony with themselves, their surroundings and companions. Upon disembarking, as it were release, people are excited about their next destination, a lasting change, and the trip was not only through space and time but also for themselves, a transformational experience.



Figure 17. Experience Goals – overview

Different categories are aligned to provide the best setting for addressing the experience of curiosity during transit. The following paragraphs explain the set experience goals and why they are chosen.

First, to make time pass and to not feel bored stimulation is required. **Stimulation** (time) helps to not feel bored about things in life in general (Wiklund-Engblom, Hassenzahl, Bengs, & Sperring, 2009, p.666). It refers to gaining plenty of enjoyment, stimulus, and to getting a time indication. Time indication can be used to learn how to deal with time (Uusberg, Naar, Tamm, Kreegipuu, & Gross, 2018) and to fight boredom to get to a ZEN state of mind, not merely being on a phone.

Dreaminess (transit) allows to reflect upon oneself and wander. One is focused on oneself as a hedonic quality calls for this question to *Why* (Hassenzahl 2008, p2) does one take this ferry or cruise. The emotion of dreaminess is a calm state of introspection and thoughtfulness and is a combination of relaxation and stimulation, to some extent, as there is an undirected cognitive activity (Desmet, 2012, p.11), a creation of meaning (Hassenzahl et al., 2010).

Freedom (place) is needed within the space to offer people to wander the choice to take part or not. They can decide whether to converse or not, it is open to everyone without having to take part. Be free to move, express oneself, and be in control. *Autonomy* plays a key role (Wiklund-Engblom, Hassenzahl, Bengs, & Sperring, 2009, p.666).

Inspiration (surroundings) derives from the brand and technology goals, as *PV* is a situational awareness solution monitoring the surroundings. Different elements and details from the surrounding are

brought forward to stimulate people with the feeling of a sudden spark of creativity. Inspiration comes with the feelings of motivation, enthusiasm and eagerness (Desmet, 2012, p.9).

Fascination (self-development) is the urge to explore, to look out for new things and to increase ones understanding. This experience driven by investigational urge can be achieved by for instance no clear purpose or meaning at first and comes with the feelings of captivation, a focused attention of explorative nature (Desmet, 2012, p.9) and *autonomy* (Wiklund-Engblom, Hassenzahl, Bengs, & Sperring, 2009, p.666)).

Finally, **Fellowship** (social) is to feel part of a bigger system. This experience is based on the important human needs to feel related to others (Wiklund-Engblom, Hassenzahl, Bengs, & Sperring, 2009, p.666), which can be achieved already by just being in the same ship or sitting in the same booth but requires some more support. This relatedness is a human need that can be addressed with the feeling of communality and friendship.

These experience goals are used to guide the ideation for different concepts, together with material from interviews and insights form observations. They are the answer to the sub-question: What are desirable transit experiences?

INTERACTION GOALS

As highlighted by Lenz, Diefenbach and Hassenzahl (2013), specific interaction attributes can help to achieve experiences. The right type of interaction helps to answer the *How-level* (Lenz, Diefenbach & Hassenzahl, 2013, p. 129). Finding the match between experiences and interactions supports a more successful psychological need fulfilment.

Experience goals	Interaction attributes and linked experiences
Dreaminess	Slow: significance of the moment, relaxing and calming
Freedom	Fluent: autonomy and continuous influence
Stimulation	Diverging: unusual, amplified grasping for attention Mediated: ambiguity and magic Targeted: Worthy of attention
Inspiration	Inconstant: Liveliness and suspense, chance as an idea generator
Fellowship	Special proximity: feeling of relatedness, being part of it Gentle: awareness, appreciation, building a relationship, being part of it
Fascination	Approximate: Room for ideas and exploration Covered: excitement and exploration

Table 2. Interaction attributes linked to experience goals based on Lenz, Diefenbach & Hassenzahl work (2013, p. 135)

CONCLUSION AND NEXT STEPS

To sum up, the desired experiences are *Stimulation*, *Dreaminess*, *Freedom*, *Inspiration*, *Fascination* and *Fellowship*. These are set as a goal to achieve with the concepts developed in the next chapter. One of the concepts will be prototyped to test whether the experience goals are valid and at the same time see if the experience goals are achieved by the concept.

In conclusion, the experience and interaction goals set the direction for the next part of the double diamond. The next diamond starts up with concept development, focusing on the opportunities and not the limits people have towards a wanted behaviour. It is still up to people to decide whether they wish to go further and actually engage with the concept. The booth example (as seen in the affinity diagram) showcases how a booth enables social interactions on the ferry. A booth allows for communication with, and separation at the same time, from other people. However, the booth might not be used while still pushing people towards a sharing behaviour. After all, the goal is to utilise the surroundings and bring it more present into the vessel instead of 'bringing Vegas to the seas' (Castillo-Manzano, Castro-Nuño and, Lopez-Valpuesta, 2017).

DEVELOP

Several ideas and concepts were generated utilising the experience goals. As a result of tests and validations, one of the concepts was developed further into a product service in the *Deliver* chapter. The concept will help to build a prototype and test out the experience goals. The concept was developed answering the question *What*, keeping the *Why* and *How* that were earlier defined in *Experience Goal Setting*. This way one can ideate for many different possible solutions.

SOLUTIONS IDEATION

A number of adequate ideation toolkits were used to translate the experience goals into ideas or concepts, namely Ideaspector (Milla Ahola, 2013) and Travel Anywhere (Falck, 2014). The overall direction was to focus on ability to tell stories worth designing for and using the stories as starting points. Some initial ideas revolved around traditional maritime objects, such as maps, compasses, telescopes, periscopes, radars, portholes and bridges.

One distinct experience of the Suomenlinna ferry is the bounce: When landing the ferry hits the fenders with some force, which makes the ferry bounce back. A lot of people do not anticipate this and nearly lose their balance.

Another initial idea dealt with darkness and how it puts up a wall one cannot see through. When one turns on the light inside one can extend vision outside (fig. 18). Hence, *PV* could help watching farther by focusing on one's inner reflections or the surroundings.

A local intriguing concept is Silo 468¹⁶, a light installation visible from the *Suomenlinna II* ferry. The light reacts to the wind and is visible at night.



Figure 18. How lights prevent you from looking outside at night
© Eva Mouton, used with permission

¹⁶ Silo 468 light installation <http://navi.finnisharchitecture.fi/en/silo-468/>

MAP OF MEMORIES

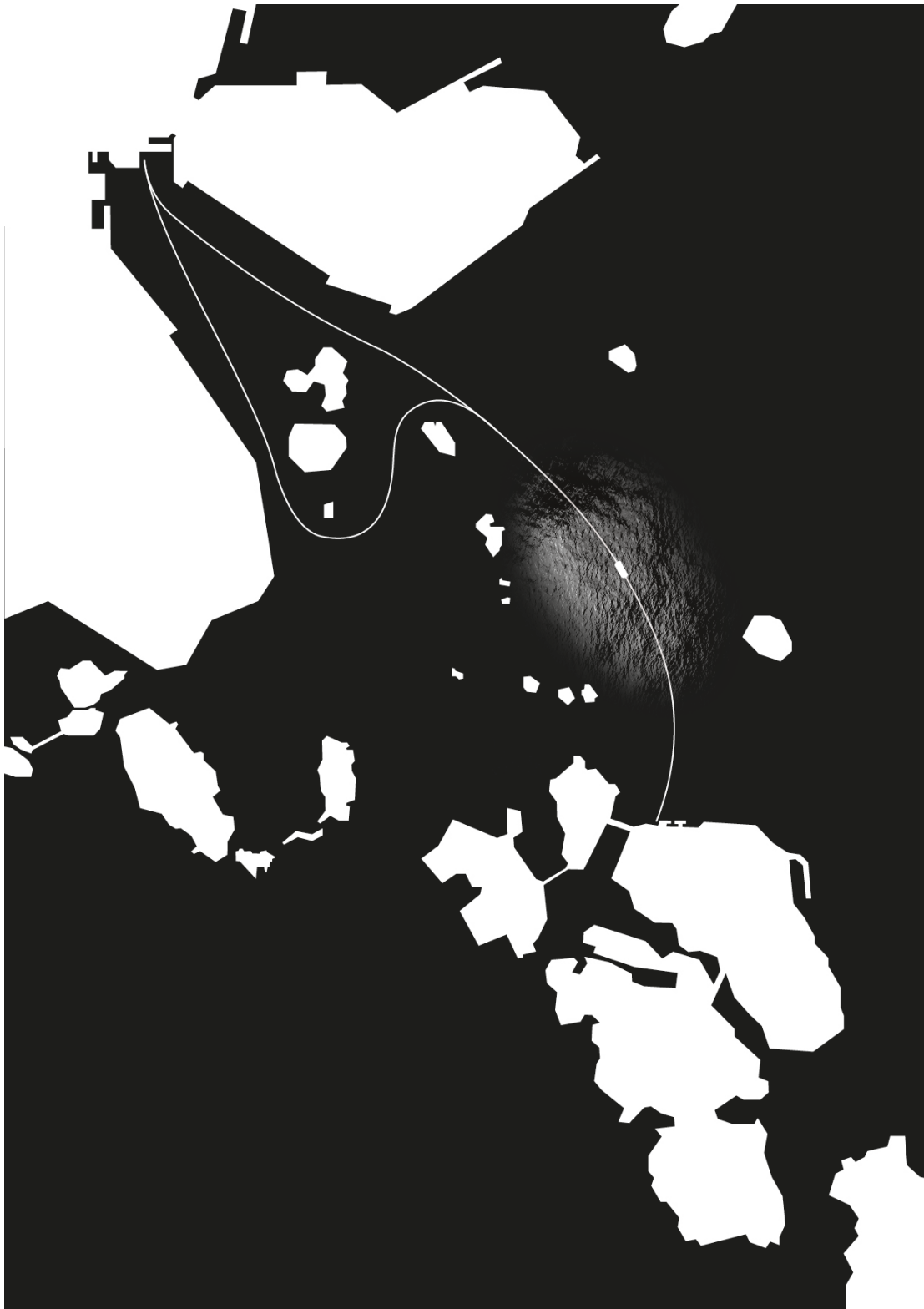


Figure 19. Map of memories

A Map (figure x) shows the current position of the vessel with the surrounding projected onto the map's surface. In the surroundings of the vessel there are memories stored. These memories can be your own but also from others, that were sent directly to you or were publically

available. This sharing can be chosen by you. A memory can be stored privately (only for you), stored by you only to be seen by one or many other people (direct message) or stored for everyone to see (public sharing).

I really like maps. They are everything, they are the memory of the trip. When I see a spot on the map, I can also see the events on that place.
- Passenger

Certain locations have a denser amount of points along the route (point of interest) for you personally or generally public. These can help guide people to look for the point of interest and also for new things to spot.

Technically it could be a browser-based application, to also enable being in touch over a distance, and a physical display present on the vessel itself. The different routes sailed by the ferry are visualized on the map together with the current sea surface texture projected on the map with the current position. The browser application also allows to check in to the data bank remotely to recall memories, to check what other people have stored or to leave a memory at the location the ferry is currently.

Fellowship: Multiple people contribute to this concept together, as it forms a social network for people on and related to the ferry.

Stimulation: See the different perspectives people have and how they look at the surroundings of the ferry.

Inspiration: Find new inspiration in your surroundings, by noticing differences that seem dull otherwise.

Fascination: Explore the now as different, starting with the sea surface.



Figure 20.

FERRY AS A MUSEUM



Figure 21. Concept art for *Journey*, Matt Nova

This concept turns the ferry into a museum to showcase the ferry's story (figure x). Different themes and topics can be used for setting the scene of the story: Fantasy, History or Public generated heritage.

Fantasy: Passenger can float with sea animals and monsters around the vessel. They interact with the surroundings and you can make them flow around. In Suomenlinna this is particularly topical due to the recent history of crowds of Pokémon trainers visiting the island to catch some rare animals.

History: One can see what happened in the surroundings through time. One can experience how the Suomenlinna sea fortress was built up from the ground and how battles were fought.

Public heritage aspect is very similar to the concept of 'Map of Memories'. It comprises of certain snapshots that are gathered in the database to be shown to others. In the museum concept, the stories could be longer.

Depending on the chosen approach – be it Fantasy, history or People's. - The content of the museum can vary significantly. It can be on board the vessel but also at the terminal to get the people more in the mood of the vessel.

Augmented Reality (AR) would be ideal for the museum concept. It could use the motion tracking and LiDAR to have the interaction with the exact surrounding. A small monitor could be available too to make it accessible for everyone. Every console would be a multiplayer; the

more people engage the more things you see happening in the surroundings for each theme.

Fellowship: interact with others to build a story

Stimulation: a game is offered to the passengers to interact with throughout the whole journey, making them excited about the trip.

Fascination: Explore and discover the surroundings more through play.

Freedom: have space around outside the vessel to play as well except of having only the space on board that is limited.

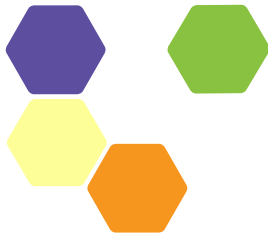


Figure 22.

WHO ARE YOU?

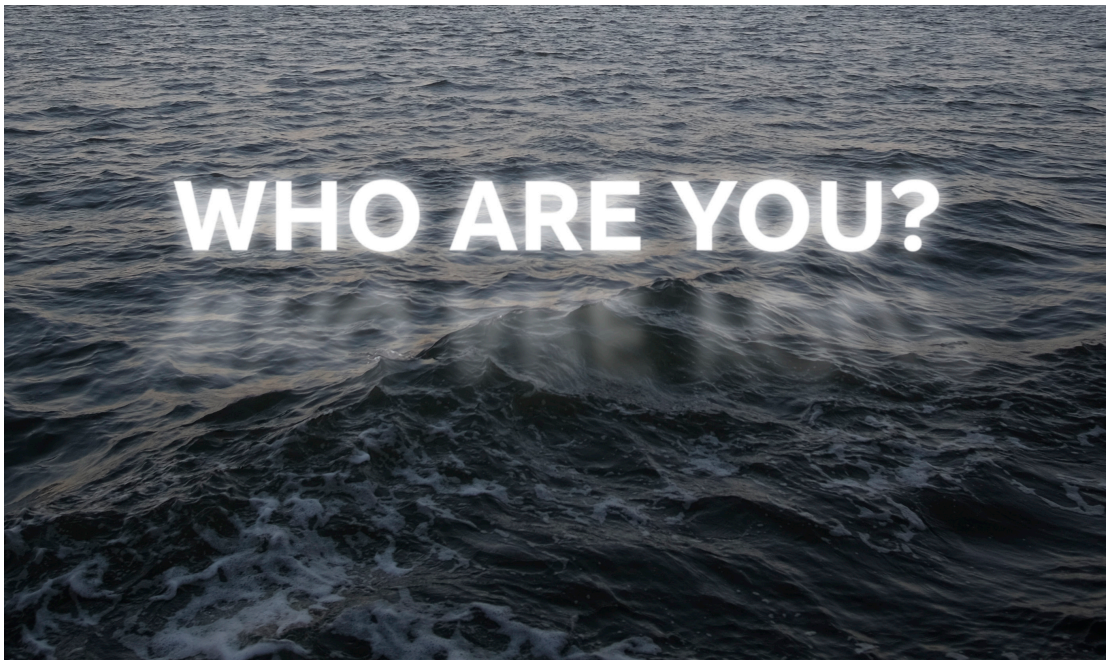


Figure 23. Who are you?

This concept provides questions and tasks to reflect on oneself and change the perspective of the passengers, emphasising on the transition from A to B (figure x). The goal is that the passengers leave the ferry as a different person with a lasting experience they take along from the ferry / cruise ride for the rest of their lives.

This is, similar to Ferry as a Museum, also an AR visual, but mobile only in this case.

The concept allows passengers to get to know each other better and form a community, by knowing each other's story. It highlights that no one is the same but that they are all in the same vessel together and part of it. They learn to live with each other.

Fellowship: get to know other people who travel on the ferry, see the diversity through their stories.

Stimulation: change to alternative viewpoints on the surroundings and yourself through different probing questions and tasks.



Figure 24.

Fascination: explore the surroundings, other people's and your own viewpoint

Dreaminess: reflect on who you are and where you want to go

SEASONAL TIME TRAVEL



Figure 25. 10th of February 2016

The Seasonal Time Travel concept (figure x) provides a contrast with the current view, as highlighted by the field studies; *"You should see it when it is all frozen"* and *"These colours in autumn are great around here."*

It can also showcase LiDAR and infrared capabilities by showing the patterns of an ice cover or vision through fog. In addition, image stabilisation of *PV* can be showcased here.

Fading through seasons could be done as in this video¹⁷ where you can see Seattle grow. Computer aided photography can show time and seasons passing by and here it could be done while on the ferry and at the terminal.

Weather on demand

Choosing the right screen size is important. A big screen might be too direct, disturbing and making one have to watch. However, smaller

¹⁷ Seattle 3 year time-lapse <https://youtu.be/OX2okGdvk8A>



Figure 26.

screens are not always found easily and have to be discovered. A small screen provides a porthole through time.

Stimulation, as there is never bad weather on board as one can choose from all the varieties and explore new ones according to one's mood. After one has actually found the porthole to travel back in time.

Fascination, how the same place can differ so much depending on the seasons, within such a short time. An infinite library of sights, open to explore and find what you like but did not know about yet.

Dreaminess, travel back in time to see the journey happen, giving food for thought and reflecting upon oneself, providing a calm state of mind.

ROCKING



Figure 27. Rocking concept

Rocking comprises a light installation installed on the ceiling of the vessel or the terminal (figure x). The idea is linked to an interview quote; *"It feels like I'm in a swing (cradle)"* - Passenger

The concept utilizes motion sensor data translated into brightness of the lights and vision colours from cameras to make up the colours and patterns of the lights.

Stimulation: Constant changes, that are unpredictable.

Dreaminess: Helps reflecting on yourself, state, hypnotising.

Freedom: You can chose to take part or not, it divides space.

Inspiration: Feel triggered to be creative, find new ideas by drifting in thoughts.

Fascination: Explore the puzzle, find what it is actually made off, what it simulates.



Figure 28.

TRADE-OFF

Based on the focus group validation process, the best concept is selected through weighing different parameters against each other. How well does it address the experience goals and human needs? How does it apply *PV*'s data? To what extent can it be implemented elsewhere? Through answering these questions the most suitable concept for further development is chosen.

Some general comments on the concepts were like the following "I would like to combine all of them somehow as they all have something nice in them, a different focus" and "I like how we are talking for 2 hours about soft values and we can still be going on, like the people left the meeting with a smile!" Which showed that the approach and concepts were well received by the experts.

MEMORY MAP

The concept did not evoke a lot of comments. The fellowship part was considered interesting but the same feature is also present in other concepts. The utilization of a map was seen interesting by many but it is not used to its full potential. This concept would require significant further development on the concept level to make it stand out.

Experience goals	Due to lack of reactions the concept appears rather flat or shallow. Fellowship was the most present, as relatedness could be created with people not present.
Pilot Vision	Focuses mainly on the camera vision, GPS data and remote connection for current situation and a databank for access to the memories.
Other applications	For crew, limited, mainly contact with family and friends away For cruise liners trickier as

Table 3.

FERRY AS A MUSEUM

This concept would be mainly based on the location of the vessel with some additional filters that can be applied. The concept can combine fantasy and history easily. This combination could resemble the theme of mythology, that fits to the history of the islands and to Finland's native mythology, making the whole concept stronger and to fix the content around a specific theme in the *Suomenlinna II* and *M/S Viking Grace* cases

The concept is too content intensive for the time frame of this project but it is very promising for implementation in other vessels too. The Finna Street¹⁸ is an extensive database for showing content; it can be used for imagery related to the journey between Suomenlinna and Kauppatori, back in time. Finna has an API¹⁹ for accessing the databank and it is open to use, as long as it is correctly referenced.

Experience goals	Fascination, stimulation, fellowship and freedom all are well present
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¹⁸ Finna Street <https://finna.fi/Search/StreetSearch?go=1>

¹⁹ Finna API <https://api.finna.fi/>

	but also inspiration as many people came with suggestions and implementation ideas.
Pilot Vision	This focuses mainly on camera vision and the remote connection to the ferry. But can be done through AR without PV
Other applications	The historical aspect could be implemented easily on other transport modes such as a tram or metro to explore a city above and below the ground. The fantasy aspect is very promising for thematic cruises. For some of them the content creation is not that hard as they already have the content present in other sources and this way an outward focus helps them to have an edge compared to on shore resorts.

Table 4.

WHO ARE YOU?

This concept proved to be demanding to communicate and to make understandable for the focus group. Some people did not know what to do with it *'I don't get this one, I really don't'*. This comment was raised because the concept was seen rather vague and dreamy *'I like how it is dreamy and I could see this together with Seasonal Time Travel, to see differences in people's reactions over the seasons.'*

The threshold for this concept might be too demanding from many people to take part. The questions might be taking the goal of self-reflection and dreaminess just a step too far, but it can be a good way to trigger people to look differently at life through tasks and questions.

Experience goals	Dreaminess with some effort thereafter a strong feeling of fellowship among passengers.
Pilot Vision	Only requires camera vision when saved over time, more of motion correction from sensors.
Other applications	Mainly on board of a vessel, a remote connection could be used for revisiting or meditation. A logbook of the people of Suomenlinna II could be created out of this

Table 5.

SEASONAL TIME TRAVEL

This concept was received the most enthusiastically by many as it gives control over something we don't have control at all *'I really like the 'weather on demand' feature. It is something that so many people want and that can make or break a trip for me.'*

Also when it turned out later on that it would not be implemented, people kept talking about it *'The small porthole display, I think you should do this in any case. The time travel through a port hole is a great way of telling stories and the search for it makes it a really strong concept for me.'*

This concept would perhaps only show its full potential in Finland and the test of the Nordics, sub Arctic areas, with the clearest seasonal differences in amount of ice and daylight. In other locations the cruises might be there just for good weather season, in the sense the cruise visits a destination only once a year. Hence, one could go to previous years or experience the difference day versus night, too.

Experience goals	Stimulation and fascination are really strong here
Pilot Vision	Camera Vision and a logbook of the journey, based on GPS data and weather information, could benefit the integration of multiple digital products of ABB M&Ps for a more extensive overview.
Other applications	Arctic conditions cruises to help raise awareness. Can be used also not on board of the ship as the travel is through time and can be experienced from a remote place.

Table 6.

ROCKING

“Does it prevent seasickness or just enhance it?” The focus group discussion proved that it is worth testing it out! On the experiential level it has a wide variety of strengths and it is not too straightforward. “How about adding sound somehow, how can we use sound in one of the installations?” was a reminder to add this extra dimension. The sound was part of the concept but not fully explained during the session. The comment ‘It uses also sound, like in [...] a game, I helped develop.’ gave direction on how to implement the sound within the installation.

While the previously listed concepts can be achieved by using a screen, Rocking has a different physical appearance. It is more a translation of the data than a curated version of it, as in the other ones. Rocking is less content driven and thus it can be applied to various places. One option is to use it at the terminals (a non-place) for a more meaningful waiting time and eventually guiding passengers on board, which can be done on board as well. The concept is abstracted to a certain level, which also makes it intriguing from an artistic point of view.

Experience goals	Dreaminess and fascination
Pilot Vision	Mainly based on the camera vision but can use LiDAR as well. Creative use of the motion sensors that correct the LiDAR data.
Other applications	Engine control room, remote bridge and control room.

Table 7.

TRADE OFF CONCLUSION

To sum up, *Rocking* adds an extra dimension to the experiencing of the installation and helps people know where they are without seeing it. Nevertheless, the aim is to avoid direct and clear sound recording that could be useful in other cases. In order to enable more fascination, the sound needs to be abstract too. The sound could be from recordings but manipulated. Rocking seems the most successful adoption of the *PV* sensor data to an unusual experiential level, by translating the data into an artistic viewpoint that can help evoke desirable transit experiences.

According to the focus group, *Rocking* has the most potential from all of the concepts. It can be broadly implemented in different scenarios and locations. It has the most different functionalities that provide each another touch point for possible enjoyable and meaningful experiences. *Rocking* could also be utilized in the Engine Control Room and other crew premises. Remote Engine Control Rooms can also benefit from this solution, as the crew can get the motion feedback.

Rocking has the most potential on addressing the experience goals and the corresponding positive emotions or human needs; *Dreaminess*, *Freedom (Autonomy)*, *Fellowship (Relatedness)*, *Influence (Popularity)*, *Stimulation*, *Inspiration and Fascination*. Not each and every human need can be fulfilled but to some extent to give more depth to the experience. Also the stimulation of a different sense, motion can contribute to this. For these reasons *Rocking* is used to evaluate the desirable experience goals and how they have been achieved with utilising *PV* sensor data.

DELIVER

CONCEPT DEVELOPMENT

Having been selected as the most promising concept, the *Rocking* concept was further developed and planned in detail, covering different aspects. “*It feels like I’m in [sic] a swing [cradle]! I learned to relax and enjoy the peacefulness. This place is my den.*” – Passenger’s comment on how the ferry feels like. This feeling of safety is very important as noted by Ahola and Mugge (2017) and can be reflected within the concept by how the installation embraces the whole space underneath.

Rocking is an Audio Visual installation that brings the surroundings into the ferry interior and thus tries to make passengers more aware of the surroundings of the vessel. By *Rocking*, the surroundings of the vessel are made more tangible inside the vessel, both visually (image) and audible (sound), mounted overhead on the ceiling. The installation aims to operate in the background by being unobtrusive but always present, free and ready to be observed.

Rocking does cover the whole space as it is above the passenger area but it does not occupy the whole space, as it is not the main lighting source and the sounds blend when talking. By covering the whole area it connects the space and unites the people underneath. They are together in the same vessel with the same destination or at least direction. At the same time, *Rocking* divides the space showing what the extremes of the space are. It shows where there is more motion on board the vessel and where the most stable part is, connecting the people, vessel and surroundings.

The simulation of the vessel’s motion makes people more aware of the subtle movements of the vessel. Together with the sounds from the installation it helps people to take a break from the daily rush and reflect upon themselves, the day, the surroundings... Passengers dream away while gazing over the seascape, or they can enter a new dimension by closing their eyes and shifting their focus to the surrounding and generated soundscape.

A more curious passenger might start questioning the installation. What do the light intensity movements stand for? How about the colours and sounds? Once the puzzle is unravelled, the surroundings become clearly present inside the vessel itself. No ferry ride or cruise trip will be the same as the other as passengers are guided subtly to put attention to the surroundings, scanning for inspiration through a creative impulse of a wave pattern, sea life, other vessels or the seascape.

One intriguing question is whether *Rocking* could have an impact on motion sickness, and whether it could even make the passenger feel less sick. Motion sickness usually derives from a sensory conflict or ‘mismatch’ between sight and the vestibular system (Murdin, Golding & Bronstein, 2011). This question would require further research but it is not in the scope of this project.

There are two aspects of the visuals. First there is the intensity that follows the rocking of the vessel. Second, there are the colours of the surroundings that are represented throughout the whole installation. The audio is also a translation of these inputs and is arranged in the surrounding as ambient sounds, part of the environment.

Pattern of the intensity could be developed and tested in such a way that it resembles the movement of the ship the best. There could six degrees of freedom of motion, three linear motions: Surge, Sway and Heave (movement along X, Y and Z axis) three rotation motions: Roll, Pitch and Yaw (rotation around X, Y and Z axis)

Rocking can also be installed in a remote or on board engine room. The installation can be used to get a better awareness about the situation the remote vessel is in, with the help of the simulated motion. A terminal where passengers are waiting for a ferry has a lot of potential too as the installation allows also for distraction during waiting times and guides people to board or go ashore when the vessel arrives. This way the vessel is linked to the shore and waiting areas.

PROVOCATIVE PROTOTYPE

To discover the experiences that are embedded within the concept in a fast and agile way during the design phase a provocative prototype was built. The prototype is used in user tests and a focus group session to evaluate the experience goals. At this stage the concept and the underlying goals get a more tangible form, both physically and digitally.

On a lower level, *fellowship* is achieved by uniting all the people underneath the installation. At the same time the installation also divides them as the movement in the display can separate people. This will be hard to be tested as a scale model is used. The light and sounds are not the main light and sound sources in the space, allowing *Freedom* to take part. People can pay attention to the installation or not by diverging their attention to something else. For instance people should be able to talk over the sounds easily. The light and sounds are a *stimulation* of sight, hearing and motion senses as it is an ever-changing play, creating awareness of the surroundings. *Fascination* can be achieved when one tries to explore and unravel the puzzle or when questioning what the installation is about. *Dreaminess* reflects upon oneself. Find *inspiration* from thoughts or sight.

The prototype set up consists out of a Neopixel matrix, a FadeCandy LED controller²⁰, smart phone with oscHook²¹, a speaker and a webcam are used for the hardware. On the laptop openFrameworks (by Alex van Giersbergen²²), SuperCollider (by J. Camilo Sanchez Carranco²³) and

²⁰ FadeCandy <http://www.misc.name/fadecandy/>

²¹ oscHook in Google Play Store
<https://play.google.com/store/apps/details?id=com.hollyhook.oscHook&hl=en>

²² Alex van Giersbergen <http://www.wtf0.nl/>

Pure Data (by Jukka Kääriäinen²⁴) process the incoming data. The movement and location data is first used to generate sound with SuperCollider and Pure Data. The gyro data is also sent over Open Sound Control (OSC) to openFrameworks where the brightness of the webcam image is manipulated according to which way the boat is tilted, lighting up the side that is lifted up and darkening the side that is lowered. The gradients by Merijn Hos²⁵ were inspiring of how abstract the look of the colour on the ceiling should be.

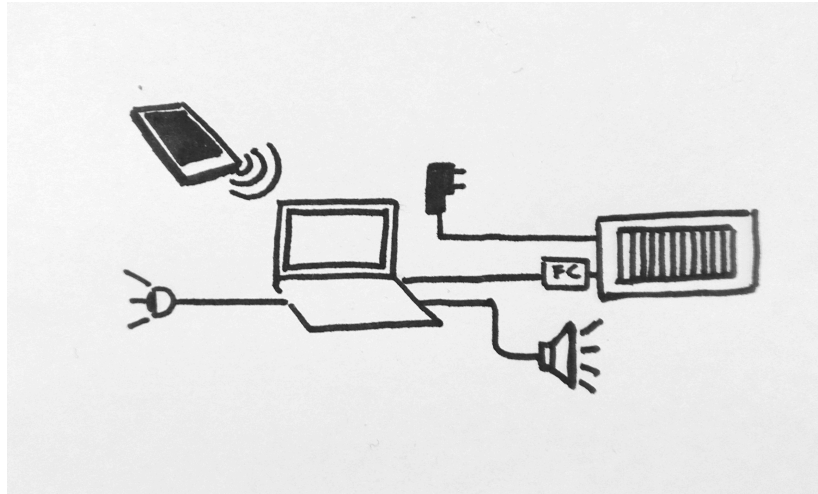


Figure 29. Rocking drawing



Figure 30. Test set-up

For the test people are asked first to evaluate the *Suomenlinna II* ferry with AttrakDiff. Afterwards they are introduced to the provocative prototype set-up of the Rocking concept, accompanied with a drawing of how it would look like when it is installed. After which the participants fill in a second AttrakDiff form. When there is enough time during the

²³ J. Camilo Sanchez Carranco <http://krrnk.com/>

²⁴ Jukka Kääriäinen <http://www.jukkakaariainen.com/>

²⁵ Merijn Hos <http://merijnhos.com/Gradient-Exploration>

transit they evaluate the different experience goals using the MAX board to get a better understanding of the experiences that have been provoked or not through the prototype²⁶.

TEST RESULTS

The following results comprise the findings from the provocative prototype user tests and second focus group only. The provocative prototype was evaluated in two use cases. The first evaluation as a user test took place on board Suomenlinna II with passengers (n=20). The second evaluation took place as a focus group in 'the lab' at ABB M&Ps facilities in Vuosaari, Finland (n=6) where there is an engine control room simulator.

USER TEST

On *Suomenlinna II* both AttrakDiff (n=20) and MAX (n=9) evaluations were conducted. Due to the limited time on the ferry not everyone could complete every part of the test and hence there were fewer participants in the MAX evaluation.

The focus was mainly on AttrakDiff. It is a scientific evaluation method and a tool, for quantitative evaluation. MAX was used to uncover qualitatively how the experience goals are achieved. Participants were selected on the ferry based on where they were sitting (inside) and in the vicinity of the test setup.

ATTRAKDIFF EVALUATION

The AttrakDiff method (Hassenzahl et al., 2003) evaluates the pragmatic and hedonic qualities of an interactive product or service.

As seen in the portfolio (fig. 31) Rocking Concept performs reasonably well as regards pragmatic quality (PQ). Pragmatic quality refers to usability and to the extent the concept achieves its objectives. The average value is in the square *task-oriented* and the small size of the confidence rectangular supports the achievement. On the pragmatic level, two features stand out; technical and unpredictable.

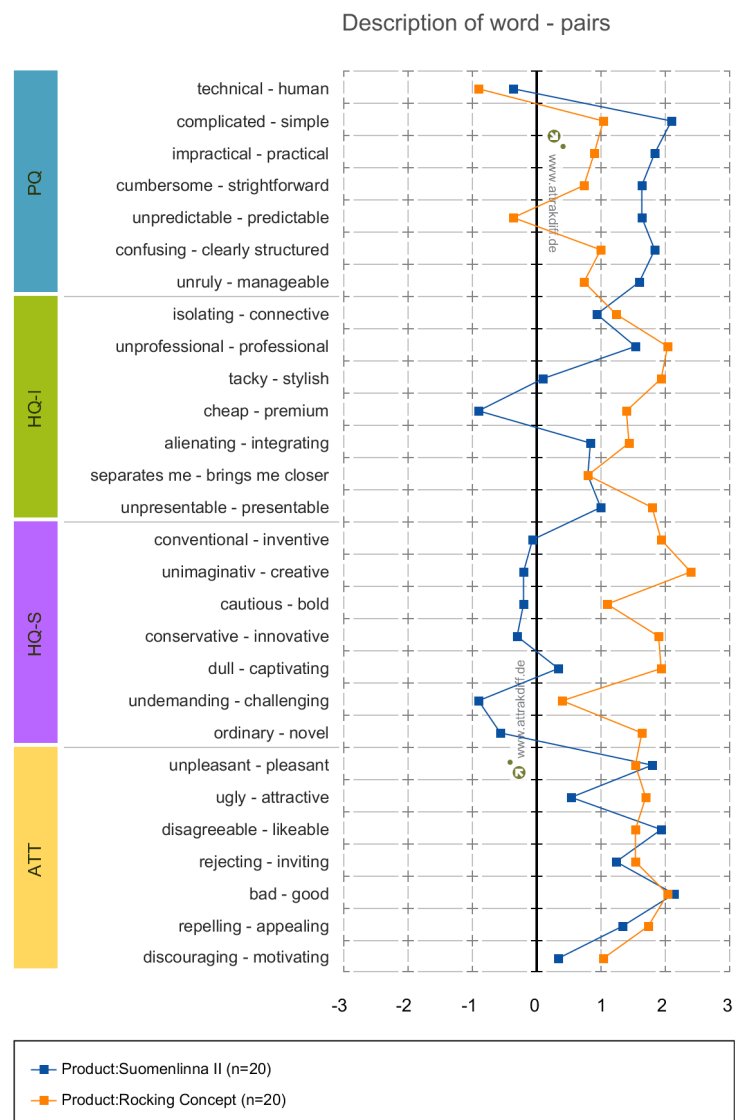
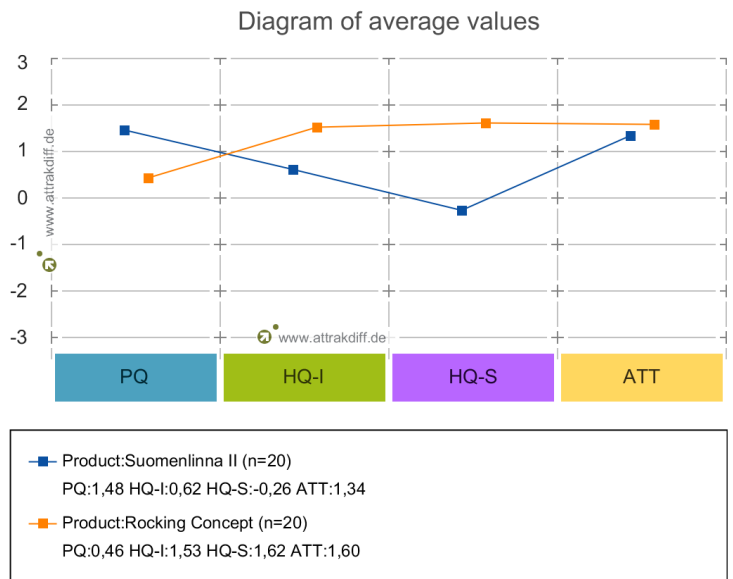
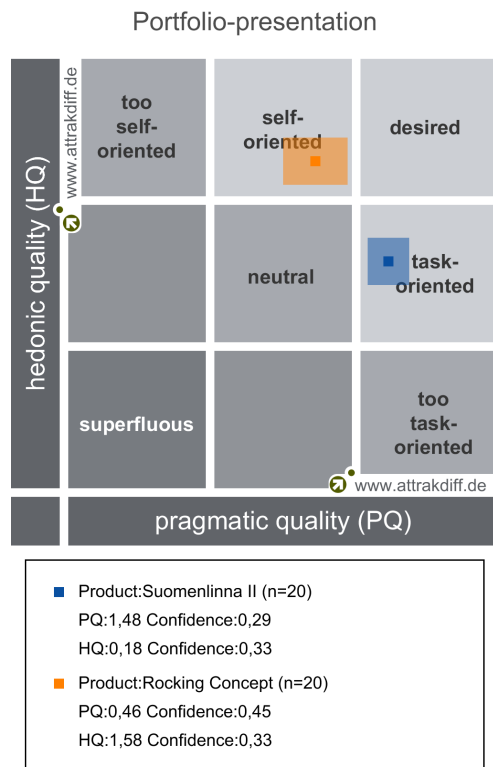
Hedonic quality (HQ) is related to how people can identify with the product. On the hedonic level, Rocking reaches the top row of the portfolio (fig. 31), the square *self-oriented*. Portfolio presentation (fig. 31) and the average diagram (fig. 32) together show strong scores for hedonic qualities of stimulation and identity. While the features premium, presentable, professional and stylish stand out on the hedonic identity level, creative and captivating stand out on the hedonic stimulation level,

On the level of attractiveness, global value based on the quality perception, there are no clear differences in features. Rocking and the mere ferry receive similar scores. A promising finding is that Rocking scores very near to the goal of 'brings me closer', pleasant and good.

²⁶ Prototype of Rocking concept <http://bit.ly/rockingconcept>

From the values on portfolio-presentation (fig. 31) and the diagram of average (fig. 32) show clearly that the hedonic qualities for stimulation and identity score strongly. Rocking helps to motivate, enthrall (fascinate) and stimulate people. While it has a below average on a practical level, thus not ultimately assisting people. Therefore a more practical assistance is required for the next iteration of the *Rocking* concept.

To sum up, the *Rocking* Concept achieves high scores on the hedonic quality, compared to a strong pragmatic quality of *Suomenlinna II* (Fig. 33). Hence, a more practical usage of the *Rocking* concept could improve the overall desirability of the concept, and help reaching the top right corner of the portfolio, *desired*



Figures 31-33. AttrakDiff result – Portfolio presentation, Diagram of average values and Description of word-pairs

MAX EVALUATION

The results of the MAX evaluation give more insights into which extend the experience goals have been achieved. As the following table (Table 8) shows, the Rocking Concept enables a wide range of experience goals.

Freedom	Relaxed 8	In control 1	‘I can choose if I pay attention to it or not’		
Fascination	Slightly curious 2	Interested 2	Curious 4	Thrilled 1	‘I want to know what it is about’ ‘Do you hear that, I can hear something, where is it coming from?’ ‘What do you have here?’
Fellowship	Acquainted 8	Togetherness 1	‘Connected to nature’		
Dreaminess	Aware and attentive 2	Reflective 2	Daydream 1	‘Attentive to motion’ ‘I can hear some ZEN-sounds, like calm in the background’	
Stimulation	Driven 6	Excited 3	‘Driven, as this is a great idea, I’m sort of jealous of it. You kicked my a**.’		
Inspiration	Supported 5	Inspired 4	‘I do light installations myself, this has given me some new ideas, I know a lot of people who would be inspired by this too.’		

Table 8.

There were also comments reaching over the categories: "Thrilled and inspired, I see those [Fascination and Inspiration] as a pair, linked together, also relaxed and daydream [Freedom and Dreaminess] is such a pair."

FOCUS GROUP

Focus group (n=6) evaluated the Rocking concept by AttrakDiff. Compared to Suomenlinna II use tests, the focus group was familiar with the concept... Their comments highlighted in particular the movement of the vessel. The concept could work for an on-board and remote engine room.

The comments on motion varied but were mainly positive; from "I want to see movement" to "Great that it shows motion, like we know we are moving because we can see it from the screen and, feel and hear it from the vibrations of the engine. But we don't know how fast and where and so on." But the main interesting one is maybe how lower frequency movements should be addressed "The prototype shows the rather fast frequency movements, which is valuable but how about the lower frequency ones? These are very hard, also for people on board to estimate how fast a ship is drifting in a certain direction." This would be interesting to explore more and how to present stimuli to people to raise awareness of low frequency movements or drifting of a vessel.

Sounds might give a solution to this as some noted it could provide a solution to many indications that are given now visually, "Sounds are nice, we should explore that more. For alarms and indications of surroundings of the vessel." and "How would an island sound like? Or a ship?"

While others were more considered about the technical implementation of the installation, “It will be tricky to get the right alignment with the place or get the place centred to see the visuals in the right place as the visuals need to reflect the exact movement of the space under water to avoid a misconception.” and “I see it more as an art installation. A normal TV screen would be good enough to see what is actually there as it is so boring and isolated in the engine room.”

Also the interest in the surroundings was “I would like to see what is out there” and “This would be ideal in the duty room, next to the engine control room where you can take a rest and be at peace, feel the motion and see it.” But also more specific for the operation of the vessel itself, “Three sides would be nice to see port-, starboard and stern. The stern for how the propulsion is going and how fast we are going and the rolling. The sides for what is around us and how near, but also how pitched the vessel is.”

Also the night comes to their interest as they wonder, “How to show motion at night? When there is not enough light in the surroundings to show changes in brightness” and “How is it calculated? Light for above the water and dark for underneath makes sense during the day but how about at night?”

A similar result in AttrakDiff was achieved with the focus group participants. So even with a longer explanation and better understanding they had a similar idea about the concept.

ACHIEVED EXPERIENCE GOALS

As seen in the figures 31 - 33 (AttrakDiff results), *Rocking* performs relatively well on the stimulation level, suggesting that the concept can achieve the experience goal of stimulation but also fascination. The *Rocking* concept adds hedonic quality to the pragmatic Suomenlinna II, so together they form together a more desirable solution.



Figure 34.

Stimulation: People feel strongly stimulated by the concept as the HQ-S proves. This can also be seen within the MAX responses.

Dreaminess: This experience did not come forward itself that much. This maybe due to only surfacing over time and not during the first transit.

Freedom: AttrakDiff did not have any means to evaluate this experience goal though MAX showed that this experience is very well achieved.

Inspiration: the concept scored high on the word related to inspiration, such as creative, innovative, novel and inventive. The MAX responses showed a similar result.

Fascination: This was strongly present as it scored high on stimulation and enthrall within AttrakDiff as it is captivating. Also in Max this was shown and strongly present in the responses.

Fellowship: togetherness was not achieved to that much according to the both AttrakDiff and MAX evaluation. As it is slightly more connective, integrating and inviting, it scores the same on brings me closer as the ferry.

DETAIL DESIGN

Based on the two use case evaluations, the following features and improvements were considered particularly important additions for the next iteration of the concept prototype. The possible additions are mostly of a practical origin, such as the waiting area / terminal scenario where the concept connects and guides the people to the vessel. Other implementations that were taken in to consideration are; souvenir or cabin light for passengers and screensaver for related software applications for staff and crew.

Night mode needs improvement: It requires showing something but not too much, as one still wants to be able to see outside. Light of buoys, lighthouses or other vessels can be used on sea level, while the moon, stars and other celestial bodies and satellites can also be part of the night vision. At nighttime LiDAR can be used as a sensor input to show how certain objects pass by in the surroundings. The light strips should be mounted perpendicular to the windows, mounted in proximity to lead the eyes to the surroundings, outside the vessel.

Regarding sound, the use cases suggested some possible improvements. It could be possible to follow a story structure that goes from slow to busy and again to slow and also different patterns of intensity could have been used. This would tap into the experience of travelling from busy and crowded Helsinki to calm Suomenlinna, transporting people into a different mind-set when they arrive home or on the island. On the way back, the sound could energize passengers so that they are able to handle the rush of the city.

As Hassenzahl et al. (2013) show within their shared TV concept, different patterns can be created for both light and sound to increase the storyline of the experience. For the ferry, it would be possible to build up (anticipation phase) to the transit experience when arriving to the terminal and embarking, have the ferry crossing or cruise trip (event of transit) and the cooling-off phase when disembarking. Building up can be done in the terminal, cooling down when the ship is mooring. Non-spaces (Augé, 1992/1995), such as the ferry terminal, are particularly useful places to bring in meaning and identity as these places lack history and relation to the place. Extra safety functionality could be included too. One approach for further exploration could be making the installation responsive to people and help way-finding in case of an emergency evacuation.

DISCUSSION

This chapter reflects on the findings from the research and design cycles. It also evaluates the relevance and meaning of the results found. Moreover, it evaluates the validity of the thesis. Suggestions for future research are also made, as well as for what should be taken into consideration in design of experiences.

TRANSIT EXPERIENCES

The results of the first diamond, i.e. literature review, diary studies, interviews and observations, show that the passengers have a wide range of experiences. The affinity diagram highlights that transit experiences are also strongly woven between various categories, for example gaining new insights is linked to time, place and self-development to which the transit offers the possibility. This project focused on ferry and cruise experiences but the categories can be applied to study other transit experiences and experiences in general.

The transit experience depends on how people relate to these most essential categories in question. As noted by Radic (2017), people want to form their own experiences. In contrast to other transit modes, in the case of ferry and cruise transit there are opportunities provided as space is abundant; however it can become challenging when space is over occupied or crowded (Bitner, 1992).

As pointed out by Hassenzahl et al. (2017), the main difference between different transit experiences is the mindset towards the transit itself that people have, independent of the transit mode. Affinity diagram analysis resulted in similar conclusions. During a transit people want to be stimulated and ferry and cruises can offer a variety of activities depending on the type of passenger. Compared to a car trip, where the surroundings are limited, for a waterborne transit the surroundings are ever changing making it a source of mystery, ready to be unravelled.

DESIRABLE TRANSIT EXPERIENCES

As analysed in the chapter *Deliver and Experience Goal Setting*, desirable transit experiences are mostly linked to the six key categories, *time*, *transit*, *space*, *surrounding*, *self-development* and *social*. These six categories are similar to the findings by Bitner (1992), Huang and Hsu (2010) and Satta et al. (2016) combined. Wiklund-Engblom et al. (2009) and Desmet (2012) have each built a general theoretical base for designing for positive experiences. Their ideas were proven to be fruitful also for ferry and cruise transit experiences in particular.

Among numerous potential experience goals, this study identified six separate particularly relevant experience goals: *Stimulation (time)*, *Dreaminess (transit)*, *Freedom (space)*, *Inspiration (surrounding)*, *Fascination (self-development)* and *Fellowship (social)*. In comparison, Hassenzahl et al. (2017) differentiate also between the commute to work and back home, and they use fewer experience goals at once. This

study addressed multitude of people with opposite directions at the same time and thus there were more experience goals set.

PILOT VISION ADOPTED FOR DESIRABLE TRANSIT EXPERIENCES

The original motivation of this thesis is the existence and development of *Pilot Vision* at ABB M&Ps. *PV* and the newly available data that comes with it provide a new space for exploring opportunities for new products and services. As this is a vast unexplored area and the brief for the project was open, this study design provides only one way to approach it.

The objective of this study was to look into the relationship between transit experiences and the surroundings while on board a waterborne transit mode. The hypothesis and research questions focused on emphasizing the vessel's surroundings in order to enhance the transit experience. The data from *PV* brings about a variety of means to address the desirable transit experiences.

Based on the findings from the concept development and prototyping *Marine Pilot Vision* can be adopted in promising fashion to address desirable transit experiences. As *PV* focuses on the surroundings it can extend the perception of the people on board beyond the vessel and their senses.

Experience goals embody the defined desirable experiences and the prototype was evaluated in the light of these. The *Rocking* concept was prototyped to test if the experience goals are valid and to evaluate at the same time if the experience goals are achieved within the concept using *PV* data.

All six experience goals are present in the *Rocking* concept. Some of the experience goals lend themselves to be seen as pairs, for instance fascination allows for inspiration when trying to unravel the puzzle. Moreover, freedom allows the undirected cognitive activity of dreaminess to happen. While not all the experience goals can be experienced at the same time, some are to be uncovered through extensive usage. Dreaminess is a good example of an experience goal that can only be fulfilled over multiple encounters. The most easily achievable experience goal is stimulation as noted in the prototype evaluations. Designing for fellowship experience proved to be challenging. This can be due to the fact it was not first embedded within the concept and not sufficiently integrated to come to fruition. Nevertheless, previous research has integrated fellowship or relatedness experiences in a promising fashion such as in Hassenzahl et al. (2017).

The goal of *Rocking* is to utilise the surroundings and bring it more present into the vessel, providing people a novel activity and space of opportunities. As Desmet & Hassenzahl (2012) have suggested it is fruitful to focus on the opportunities and not the limits people have

towards a wanted behaviour. For instance if the target is to keep people away from their smart phones, they should be stimulated to find other activities instead of limiting their phone use. It empowers people to make the decision whether they wish to actually engage with the concept.

Many studies aim at solving practical problems such as Kruskopf (2017). According to the results, the set experience goals and prototype address hedonic potential within transit experiences. In contrast, the pragmatic quality was not sufficiently achieved. Thus, the be-goals were addressed whereas the do-goals were not sufficiently covered. This was also seen in the interviews and evaluations, as ferries were considered very practical as such. As also highlighted in the concept evaluation, ferry as a transit mode has a remarkable hedonic potential compared to other means of transport. As the chosen concept, Rocking, worked more on a cognitive level the interaction attributes could be fulfilled while do-goals remained unclear, such as focusing on the surroundings. One option to clarify potential do goals is the fascinating idea of preventing motion sickness via Rocking and thus creating added value. This thought was noted by several participants but would need to be studied further.

Transit experiences have been covered by various studies and researchers. Ferries and cruises have also extensively studied but often from the point of view of managerial decision making, usability and entertainment.. In comparison, this study taps into the novel possibilities brought about by technological development and the new data collection and analysis methods, such as Pilot Vision.

The defined experience goals can be applied to different transit modes such as autonomous vehicles, as Hassenzahl et al. (2017) do. The experience goals are partly based on observations of alternative means of transport. These observations include train, tram, metro and bus rides plus airplane flights, mainly based in and around as well as from and to Helsinki, but also in and on the way to Milano, where a remotely operated metro, planes and trains provide valuable insights. These could be areas that the solution can be extended into as well and where the results of this study can be applied

LIMITATIONS OF THE RESEARCH

The testing of the *Rocking* concept provided useful insight and made it possible to evaluate the first impressions on the concept. However, the prototype test set-up was not optimal in terms of the physical aspects of the prototype, such as size, mounting and appearance. Over the course of the evaluation sessions, several participants gave comments such as, "It is hard to evaluate, like I have to imagine a lot." and "I do not get the feeling enough to answer." Further development of the prototype could have helped to overcome these obstacles.

Another limitation was set by the amount of participants, especially for MAX evaluation. Due to time and schedule constraints of the chosen

ferry transit not every participants could dedicate their time to finish the evaluation. Thus MAX evaluation provides some insights but would need a bigger sample of participants with longer interviews.

AttrakDiff proved to be a useful tool for evaluating transit experiences. However, it is developed for interactive product evaluation while the prototype of *Rocking* might not allow enough interaction at this stage. Hence, some of the word pairs were not seen relevant by the participants.

As regards selecting participants for the ferry diary studies and interviews they were all frequent travellers. In case of *M/S Viking Grace*, everyone, except one, was resident of *Åland Islands*, and no tourists were interviewed. The field trip environment directed to these selections, as many other passengers' activities on the cruise did not allow interviewing them, according to situational judgement. And of course as a frequent commuter on *Suomenlinna II*, I might have taken more into account the viewpoint of a commute than the one of a traveller, tourist.

RECOMMENDATIONS FOR FURTHER RESEARCH

The research project provides diverse ideas for further research. One option is scaling up the prototype. A bigger prototype could be installed on a cruise for a longer time, or on the *Suomenlinna II* ferry so people can experience it for multiple trips, longer than just once for 15 minutes. This would also allow looking into the possible differences between ferries and cruises. It would also be intriguing to use a bigger sample size and to compare different groups such as crew and passengers, tourists and locals.

This study focuses only on sea travel, ferries and cruises. However, the transit experience goals are not unique to waterborne transport but they are also relevant for other means of transport (Hassenzahl et al., 2017). Thus, the experience goals can be applied to other transportation modes from leisure travel to commuting, for passengers and crewmembers.

Already the near future will bring about more and more autonomous transport. While *PV* data enables new transit experiences it is fundamentally just a set of sensors, a tool for situational awareness in vessels. Autonomous vehicle industry uses similar sensors to *PV* for passenger cars and trucks. The experience goals defined in this project are also present in autonomous vessels and can be applied also on such transits. Autonomous transport sets high requirements for data, which then provides tools and building blocks for better transit experiences as another by-product or service.

In this project, the selected concepts provided sufficient diversity and directions for prototype development. However, there are numerous other possible starting points. Some of them are worth mentioning as they can be explored more and could be fruitful tracks for future

research. For instance, as explained in *Solution Ideation*, *PV* could be used as a Crew training tool, by setting competence an experience goal.

In essence, this project is about serving customers' customers and using *PV* data directly for their experiences. *PV* could also provide tools for improving the human interaction in customer service. The personnel on board could be better informed through *PV* about the surroundings which could provide more insights and reasons to interact with the passengers.

CONCLUSION

This research has examined the possibilities of enhancing transit experiences with the help of the surroundings of a vessel. The research question was how can *ABB Ability™ Marine Pilot Vision* be adopted for new transit experiences for crew and passengers beyond ship operations.

Passengers and crew have similar and different transit experiences. As seen in the affinity diagram, there are numerous different transit experiences. They were generalized and classified which resulted in identifying the most relevant categories: Time, Transit, Space, Surroundings, Self-development and Social. Experience ideal and goals based on the categories are stimulation, dreaminess, freedom, inspiration, fascination and fellowship. Following their guidance helped to focus on opportunities instead of solving problems.

The used experience goals focus on the surroundings of the vessel, as *Pilot Vision* is about monitoring the surroundings, and also the ship. Therefore it blends both the vessel and surroundings more into one, connecting them as a whole together. The data from *PV* brings about a variety of means to address the desirable transit experiences. As it is focused on the surroundings it extends the perception of the passengers beyond the vessel and their senses. All the generated concepts utilised this element.

To conclude, the results support that the surroundings of the vessel have a strong influence on the transit experience. *Rocking* concept achieved good scores in evaluation testing the experience goals. The most important feature was how it stimulated people on hedonic level to identify themselves with the concept. Thus, the transit experience can be enhanced by emphasizing the vessel's surroundings. *ABB Ability™ Marine Pilot Vision* situational awareness solution can provide added customer value, through adopting its sensor data for addressing desirable transit experiences.

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APPENDIX

1 INTERVIEW, CRUISE

Warming up

So we are off!

- To start I would like to ask you to introduce yourself, who are you? What do you want to tell about yourself straight away?
- How did you become where you are now in your work? Why?
- What do you do besides your profession? Hobbies? Sports? Why?
- How often are you operating this cruise?
- With how many people? How is your relationship to these people?
- How do you call this journey? Do you have a specific name or term for the trip Turku - Stockholm?

Middle

- I would like to ask you to draw your daily routine of a cruise? What are your daily activities? (Draw it with me on A3 paper + post-its)

Pre

How do you prepare for a trip?

During

How do you engage during a trip?

Post

How do you evaluate a trip?

- Whywhywhy?
- What do you want to know when you are on a vessel (Cruise ship or ferry)? (Not operated by you) Or when you see one?
- What can make or break a trip for you? Make a good one bad or make a bad one good?
- Tell about your last experience you have had being on board a vessel. Or an Anecdote.
- How do you feel when you find out something new and learn?

How would a postcard look like? One that you send in 10 years to your family about you and your profession? What would be in it?

Ending

Final questions, just fast answers wanted.

... or ...

How about ...

Who can I interview next, someone who has a totally different experience than you?

General tips for questions

“What do you mean by...?”

“Can you tell me more about...?”

“What happened when?”

“Can you give me an example?”

“You mentioned that...”

2 INTERVIEW, FERRY

Why did you choose to sit here?

What is your first impression?

What are highlights of the trip?

What can shift your experience? For better or for worse?

Do you have any questions regarding the trip yourself?

3 DIARY

RECRUITMENT POST

Dear residents of Suomenlinna,

I'm conducting a research regarding your experience of Suomenlinna Lautta and everything that is related to its context and surroundings. This research is part of my master's thesis at Aalto University in collaboration with ABB Marine. For this research I'm looking for 8 volunteers to take part in a one week diary study during October.

The one week diary study includes various simple tasks and questions. In the beginning and the end there are short surveys for getting a better understanding of you as a person. At the end of the study after returning the diaries there will be an interview with each participant separately as a follow up on what was written in your diary.

Best regards

Mathijs Provoost

INTRODUCTION & INSTRUCTIONS

This is a diary study about your daily experiences related to Suomenlinna Lautta. I want to learn more about your usage of the ferry over the course of a week. The diary includes different tasks that are given daily with a brief survey. Try to do these tasks as good as you can,

you can do multiple on one day but try not to do them all at the end.
There are two questionnaires in this diary, one at the beginning and one at the end.

The daily tasks and questions take only 5-10 minutes. In addition, there is an in-depth interview in person at the end. This will be by appointment within a week after handing over the diary, when it is most convenient for you.

Your details will be kept strictly within this research and won't be published in any form.

	assignments	duration
DAY 0	Introduction + Survey	5 – 10 min
DAY 1	Task + Questions	5 – 10 min
DAY 2	Task + Questions	5 – 10 min
DAY 3	Task + Questions	5 – 10 min
DAY 4	Task + Questions	5 – 50 min
DAY 5	Task + Questions	5 – 10 min
DAY 6	Task + Questions	5 – 10 min
DAY 7	Task + Questions	10 – 15 min
'DAY 8'	In-depth interview	30 – 45 min

Contact me if you have any questions or want to return the diary when finished:

via email via phone or via facebook

(Please return the diary as soon as possible)

WARMING UP SURVEY

How old are you?

How long do you live on the island already?

How often do you take the ferry?

How long does it take you to get to the ferry?

What do you usually do during the ferry transfer?

How do you feel about the ferry transfer? Why?

What do you like about the ferry? Why?

What do you dislike about the ferry? Why?

What does the ferry mean to you?

Do you take the ferry more or less than you would like? What prevents / stimulates you?

Mark your preference or what reflects you the best:

Example:

Croissant ○○○●○ Karelian pie

Now your turn:

Suomenlinna I ○○○○○ Suomenlinna II

Just in time ○○○○○ Before the ferry even arrives

Wait in terminal ○○○○○ Do something else than waiting there

Seasonal ticket ○○○○○ Single ticket

Read on the ferry ○○○○○ Talk on the ferry

Fixed seating place ○○○○○ Different seating place

Commuting hours ○○○○○ Day / Night time

Tourist ○○○○○ Local

Inside ○○○○○ Outside

Summer ○○○○○ Winter

Autumn ○○○○○ Spring

Recommend ○○○○○ Complain

Discover new things ○○○○○ Enjoy familiar things

TASKS + QUESTIONS

Provocative tasks are given here, to explore the behaviour and motivations of passengers in the context of ferries and cruises.

These I can get from the “anywhere travel guide”, Ideation tool kits etc., to help people go out of their zone and experience new things, this to find out how they react to specific stimuli. These stimuli can be seen as the most basic prototypes, actions they should take, even without a form or anything! (Wow great stuff I think)

- A general task for all the days, please document of what you do on board, you can use your phone or another digital camera. Please send your images to: ...

DAY 1

Task: Try to notice what influences your own decision making.

Questions:

What is the first thing you do on the ferry? Why?

Where do you sit? Why did you choose for this place?

What will you remember from this place?

What will you forget from this place?

Which other places would you like to be at? Which one not? Why?

What impression do you have of the ferry? What is the atmosphere today?

DAY 2

Task: Look behind you, look above you, look underneath you, these are your surroundings. Observe your surroundings.

Questions:

What draws your attention? Why?

What are people doing? Describe

What is the weather outside? Describe

Do they have an influence on you? Why?

How would you like to influence other people?

What impression do you have of the ferry? What is the atmosphere today?

DAY 3

Task: Go for a viewpoint, and enjoy the scenery. Close your eyes and try to imagine what this place looks like when different seasons pass by – winter, spring, summer, autumn.

Questions:

What draws your attention? Why?

What do you remember when you recall other seasons? Describe and explain why

What do you want to see? From now or other moments or seasons

What do you want to know more about?

What would you recommend others to see?

What impression do you have of the ferry? What is the atmosphere today?

DAY 4

Task: Miss the ferry, or maybe easier, recall the last time you missed the ferry

Questions:

How do/did you kill the time? (Apart from filling this in)

How do/did you feel when you are waiting for the ferry?

How do/did you feel when you are on the ferry?

How do/did you feel when you made it across?

How does this differ from a normal transfer?

Explain how you remember the time schedule of the ferry.

DAY 5

Task: Engage with a stranger in a conversation and exchange something with the person, for instance a memory for a dream ... Try to get another perspective on the ferry and see through the other persons eyes.

Here is €3,00 for a coffee on the ferry for both of you.

Questions:

Why did you choose to talk to this person?

Which topics did you talk about?

How did you understand the other person's point of view?

How did the time pass? Describe and explain why

What will you remember about this person?

What will you forget from this person?

DAY 6

Task: Listen to the sounds around you. Try to stay as silent as possible and just absorb what sounds are happening around you.

Questions:

What sounds did you notice? Any new ones?

Where do the sound come from?

How do people react to those sounds?

What effect do these sounds have on you? Do they remind you of something or ...?

How do you feel about the sounds?

How did the time pass by? Describe and explain why

DAY 7

Task: Try to notice what influences your own decision making.

Questions:

What do you notice?

What do you prefer to do on the ferry?

What would you like to do on the ferry?

Where do you sit? Why did you choose for this place?

Which other places would you like to be at? Which one not? Why?

What impression do you have of the ferry? What is the atmosphere today?

CLOSING SURVEY

Was there something that felt like wasting your time? Why?

How did you feel about the tasks? Why?

How does it compare to your usual experience and behaviour on the ferry?

Imagine a post card about the ferry in 15 years, what would you write on it?

What questions do you get from other people about the ferry often?

What questions do you have yourself?

Where do your thoughts travel to? What are you thinking about during the trip?

4 INTERVIEW, DIARY

Tell me, who are you? What do you want to tell about yourself? Like straight away...

What are your hobbies? Interests? Profession?

What do you get out of bed for in the morning? What drives you? What makes you excited?

These might be some classics, you might have heard them too many times already:

Why do you live on Suomenlinna?

How do you feel about living on Suomenlinna?

How do you feel about the ferry? Like what is your relationship to it so to say?

Why do you call it [...]?

How did you learn living with the ferry? And especially its schedule?

How does it compare to a bus, tram or metro? What impact di the ferry have on your life?

How do you deal with seldom intervals? How do you tackle this?

MIDDLE:

Can you draw and tell more about the journey of (the different stages you go through when) taking the ferry? Draw your current ferry experience, how does it look like?

You can use words to further explain your sketch!

What would be a perfect ferry ride for you? Describe...

How do you prepare for the ferry trip? Why?

You pointed out or marked that you often late for the ferry, or just in time. How do you handle or spend waiting time?

During

- What is a **good seat for you**?
- Do you visit the **deck**? Why (not)? What would be a good alternative? Would you look for an alternative?
- How do you feel about the seating position?
- What did you mean with '**Alone in a crowd**'?

- Why the **map of Suomenlinna**? Why do you like maps? What do you like about them?
- What makes you feel curious? What interests you? Stimulates you? Drives you? What do you find sensational?
- Why do you want to know about the **interiors of [...]**?
- Why do they interest you?
Why does this interest you?
Why? Why? How do you notice these?

- What do you think about the other passengers? Tell us about the different types you can identify.
- Tell me about your first impression on board?
Can you tell about the first time you used this ferry?
- How do you relate to noise, chaos and buzz in general?
- How do you relax? Or what makes you feel relaxed?
- How would you further describe the compulsory habit of you (the ferry)?
- What makes that you do the tasks in the morning and not on the way back to Suomenlinna?
- They were a pain to remember in one direction, can you explain why it felt like that?
- Why why? why?

- What made the trip surprisingly noisy (Trip 2)
- What do you dream about on the ferry? Where do your thoughts travel?
- What do you enjoy in life?
- What was noticeable about the person with the [...]? Tell me more about this person
- How did it feel being revealed to the bday plans while not being able to take part?
-

After

- What do you do afterwards? What are your plans when the ferry arrives?
- What made it a good or a bad experience?

END:

“You mentioned that...”

